Return to Master TOC
View Safety Info
Return to Master TOC
View Safety Info
Return to Master TOC
View Safety Info
Return to Master TOC
View Safety Info

RETURN TO MAIN INDEX

SVM 117-A

December 1995

WIRE-MATIC 250

For use with machines having Code Numbers: **9799, 9800, 10003, 10004.**

Safety Depends on You

Lincoln arc welding and cutting equipment is designed and built with safety in mind. However, your overall safety can be increased by proper installation ... and thoughtful operation on your part. DO NOT INSTALL, OPERATE OR REPAIR THIS EQUIPMENT WITHOUT READING THIS MANUAL AND THE SAFETY PRECAUTIONS CONTAINED THROUGHOUT. And, most importantly, think before you act and be careful.

SERVICE MANUAL

World's Leader in Welding and Cutting Products

LINCOLN® ELECTRIC

Premier Manufacturer of Industrial Motors

Sales and Service through Subsidiaries and Distributors Worldwide

22801 St. Clair Ave. Cleveland, Ohio 44117-1199 U.S.A. Tel. (216) 481-8100

Return to Master TOC
Return to Master TOC
Return to Master TOC
Return to Master TOC

WARNING

ARC WELDING can be hazardous.

PROTECT YOURSELF AND OTHERS FROM POSSIBLE SERIOUS INJURY OR DEATH. KEEP CHILDREN AWAY. PACEMAKER WEARERS SHOULD CONSULT WITH THEIR DOCTOR BEFORE OPERATING.

Read and understand the following safety highlights. For additional safety information, it is strongly recommended that you purchase a copy of "Safety in Welding & Cutting - ANSI Standard Z49.1" from the American Welding Society, P.O. Box 351040, Miami, Florida 33135 or CSA Standard W117.2-1974. A Free copy of "Arc Welding Safety" booklet E205 is available from the Lincoln Electric Company, 22801 St. Clair Avenue, Cleveland, Ohio 44117-1199.

BE SURE THAT ALL INSTALLATION, OPERATION, MAINTENANCE AND REPAIR PROCEDURES ARE PERFORMED ONLY BY QUALIFIED INDIVIDUALS.

ELECTRIC SHOCK can kill.

1.a. The electrode and work (or ground) circuits are electrically "hot" when the welder is on. Do not touch these "hot" parts with your bare skin or wet clothing. Wear dry, hole-free gloves to insulate hands.

1.b. Insulate yourself from work and ground using dry insulation. Make certain the insulation is large enough to cover your full area of physical contact with work and ground.

In addition to the normal safety precautions, if welding must be performed under electrically hazardous conditions (in damp locations or while wearing wet clothing; on metal structures such as floors, gratings or scaffolds; when in cramped positions such as sitting, kneeling or lying, if there is a high risk of unavoidable or accidental contact with the workpiece or ground) use the following equipment:

- **Semiautomatic DC Constant Voltage (Wire) Welder.**
- **DC Manual (Stick) Welder.**
- **AC Welder with Reduced Voltage Control.**

1.c. In semiautomatic or automatic wire welding, the electrode, electrode reel, welding head, nozzle or semiautomatic welding gun are also electrically "hot".

1.d. Always be sure the work cable makes a good electrical connection with the metal being welded. The connection should be as close as possible to the area being welded.

1.e. Ground the work or metal to be welded to a good electrical (earth) ground.

1.f. Maintain the electrode holder, work clamp, welding cable and welding machine in good, safe operating condition. Replace damaged insulation.

1.g. Never dip the electrode in water for cooling.

1.h. Never simultaneously touch electrically "hot" parts of electrode holders connected to two welders because voltage between the two can be the total of the open circuit voltage of both welders.

1.i. When working above floor level, use a safety belt to protect yourself from a fall should you get a shock.

1.j. Also see Items 4.c. and 6.

ARC RAYS can burn.

2.a. Use a shield with the proper filter and cover plates to protect your eyes from sparks and the rays of the arc when welding or observing open arc welding. Headshield and filter lens should conform to ANSI Z87. I standards.

2.b. Use suitable clothing made from durable flame-resistant material to protect your skin and that of your helpers from the arc rays.

2.c. Protect other nearby personnel with suitable, non-flammable screening and/or warn them not to watch the arc nor expose themselves to the arc rays or to hot spatter or metal.

FUMES AND GASES can be dangerous.

3.a. Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases.When welding, keep your head out of the fume. Use enough ventilation and/or exhaust at the arc to keep fumes and gases away from the breathing zone. **When welding with electrodes which require special ventilation such as stainless or hard facing (see instructions on container or MSDS) or on lead or cadmium plated steel and other metals or coatings which produce highly toxic fumes, keep exposure as low as possible and below Threshold Limit Values (TLV) using local exhaust or mechanical ventilation. In confined spaces or in some circumstances, outdoors, a respirator may be required. Additional precautions are also required when welding on galvanized steel.**

3.b. Do not weld in locations near chlorinated hydrocarbon vapors coming from degreasing, cleaning or spraying operations. The heat and rays of the arc can react with solvent vapors to form phosgene, a highly toxic gas, and other irritating products.

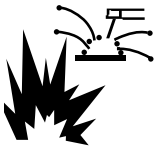
3.c. Shielding gases used for arc welding can displace air and cause injury or death. Always use enough ventilation, especially in confined areas, to insure breathing air is safe.

3.d. Read and understand the manufacturer's instructions for this equipment and the consumables to be used, including the material safety data sheet (MSDS) and follow your employer's safety practices. MSDS forms are available from your welding distributor or from the manufacturer.

3.e. Also see item 7b.

Apr. '93

Return to Master TOC
Return to Master TOC
Return to Master TOC
Return to Master TOC



WELDING SPARKS can cause fire or explosion.

4.a. Remove fire hazards from the welding area. If this is not possible, cover them to prevent the welding sparks from starting a fire. Remember that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas. Avoid welding near hydraulic lines. Have a fire extinguisher readily available.

4.b. Where compressed gases are to be used at the job site, special precautions should be used to prevent hazardous situations. Refer to “Safety in Welding and Cutting” (ANSI Standard Z49.1) and the operating information for the equipment being used.

4.c. When not welding, make certain no part of the electrode circuit is touching the work or ground. Accidental contact can cause overheating and create a fire hazard.

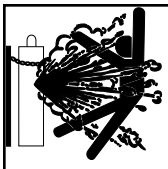
4.d. Do not heat, cut or weld tanks, drums or containers until the proper steps have been taken to insure that such procedures will not cause flammable or toxic vapors from substances inside. They can cause an explosion even though they have been “cleaned”. For information, purchase “Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping That Have Held Hazardous Substances”, AWS F4.1 from the American Welding Society (see address above).

4.e. Vent hollow castings or containers before heating, cutting or welding. They may explode.

4.f. Sparks and spatter are thrown from the welding arc. Wear oil free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes and a cap over your hair. Wear ear plugs when welding out of position or in confined places. Always wear safety glasses with side shields when in a welding area.

4.g. Connect the work cable to the work as close to the welding area as practical. Work cables connected to the building framework or other locations away from the welding area increase the possibility of the welding current passing through lifting chains, crane cables or other alternate circuits. This can create fire hazards or overheat lifting chains or cables until they fail.

4.h. Also see item 7c.



CYLINDER may explode if damaged.

5.a. Use only compressed gas cylinders containing the correct shielding gas for the process used and properly operating regulators designed for the gas and pressure used. All hoses, fittings, etc. should be suitable for the application and maintained in good condition.

5.b. Always keep cylinders in an upright position securely chained to an undercarriage or fixed support.

5.c. Cylinders should be located:

- Away from areas where they may be struck or subjected to physical damage.
- A safe distance from arc welding or cutting operations and any other source of heat, sparks, or flame.

5.d. Never allow the electrode, electrode holder or any other electrically “hot” parts to touch a cylinder.

5.e. Keep your head and face away from the cylinder valve outlet when opening the cylinder valve.

5.f. Valve protection caps should always be in place and hand tight except when the cylinder is in use or connected for use.

5.g. Read and follow the instructions on compressed gas cylinders, associated equipment, and CGA publication P-I, “Precautions for Safe Handling of Compressed Gases in Cylinders,” available from the Compressed Gas Association 1235 Jefferson Davis Highway, Arlington, VA 22202.

FOR ELECTRICALLY powered equipment.

6.a. Turn off input power using the disconnect switch at the fuse box before working on the equipment.

6.b. Install equipment in accordance with the U.S. National Electrical Code, all local codes and the manufacturer’s recommendations.

6.c. Ground the equipment in accordance with the U.S. National Electrical Code and the manufacturer’s recommendations.

Feb. ‘95

Return to Master TOC
Return to Master TOC
Return to Master TOC
Return to Master TOC

FOR ENGINE powered equipment.

7.a. Turn the engine off before troubleshooting and maintenance work unless the maintenance work requires it to be running.

7.b. Operate engines in open, well-ventilated areas or vent the engine exhaust fumes outdoors.

7.c. Do not add the fuel near an open flame welding arc or when the engine is running. Stop the engine and allow it to cool before refueling to prevent spilled fuel from vaporizing on contact with hot engine parts and igniting. Do not spill fuel when filling tank. If fuel is spilled, wipe it up and do not start engine until fumes have been eliminated.

7.d. Keep all equipment safety guards, covers and devices in position and in good repair. Keep hands, hair, clothing and tools away from V-belts, gears, fans and all other moving parts when starting, operating or repairing equipment.

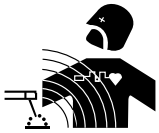
7.e. In some cases it may be necessary to remove safety guards to perform required maintenance. Remove guards only when necessary and replace them when the maintenance requiring their removal is complete. Always use the greatest care when working near moving parts.

7.f. Do not put your hands near the engine fan. Do not attempt to override the governor or idler by pushing on the throttle control rods while the engine is running.

7.g. To prevent accidentally starting gasoline engines while turning the engine or welding generator during maintenance work, disconnect the spark plug wires, distributor cap or magneto wire as appropriate.

7.h. To avoid scalding, do not remove the radiator pressure cap when the engine is hot.

ELECTRIC AND MAGNETIC FIELDS may be dangerous



8.a. Electric current flowing through any conductor causes localized Electric and Magnetic Fields (EMF). Welding current creates EMF fields around welding cables and welding machines

8.b. EMF fields may interfere with some pacemakers, and welders having a pacemaker should consult their physician before welding.

8.c. Exposure to EMF fields in welding may have other health effects which are now not known.

8d. All welders should use the following procedures in order to minimize exposure to EMF fields from the welding circuit:

8.d.1. Route the electrode and work cables together - Secure them with tape when possible.

8.d.2. Never coil the electrode lead around your body.

8.d.3. Do not place your body between the electrode and work cables. If the electrode cable is on your right side, the work cable should also be on your right side.

8.d.4. Connect the work cable to the workpiece as close as possible to the area being welded.

8.d.5. Do not work next to welding power source.

Mar. '93

Return to Master TOC
Return to Master TOC
Return to Master TOC
Return to Master TOC

PRÉCAUTIONS DE SÛRETÉ

Pour votre propre protection lire et observer toutes les instructions et les précautions de sûreté specifiques qui parraissent dans ce manuel aussi bien que les précautions de sûreté générales suivantes:

Sûreté Pour Soudage A L'Arc

1. Protegez-vous contre la secousse électrique:

   a. Les circuits à l'électrode et à la piéce sont sous tension quand la machine à souder est en marche. Eviter toujours tout contact entre les parties sous tension et la peau nue ou les vétements mouillés. Porter des gants secs et sans trous pour isoler les mains.
   b. Faire trés attention de bien s'isoler de la masse quand on soude dans des endroits humides, ou sur un plancher metallique ou des grilles metalliques, principalement dans les positions assis ou couché pour lesquelles une grande partie du corps peut être en contact avec la masse.
   c. Maintenir le porte-électrode, la pince de masse, le câble de soudage et la machine à souder en bon et sûr état defonctionnement.
   d. Ne jamais plonger le porte-électrode dans l'eau pour le refroidir.
   e. Ne jamais toucher simultanément les parties sous tension des porte-électrodes connectés à deux machines à souder parce que la tension entre les deux pinces peut être le total de la tension à vide des deux machines.
   f. Si on utilise la machine à souder comme une source de courant pour soudage semi-automatique, ces precautions pour le porte-électrode s'applicuent aussi au pistolet de soudage.

2. Dans le cas de travail au dessus du niveau du sol, se protéger contre les chutes dans le cas ou on recoit un choc. Ne jamais enrouler le câble-électrode autour de n'importe quelle partie du corps.

3. Un coup d'arc peut être plus sévère qu'un coup de soliel, donc:

   a. Utiliser un bon masque avec un verre filtrant approprié ainsi qu'un verre blanc afin de se protéger les yeux du rayonnement de l'arc et des projections quand on soude ou quand on regarde l'arc.
   b. Porter des vêtements convenables afin de protéger la peau de soudeur et des aides contre le rayonnement de l'arc.
   c. Protéger l'autre personnel travaillant à proximité au soudage à l'aide d'écrans appropriés et non-inflammables.

4. Des gouttes de laitier en fusion sont émises de l'arc de soudage. Se protéger avec des vêtements de protection libres de l'huile, tels que les gants en cuir, chemise épaisse, pantalons sans revers, et chaussures montantes.

5. Toujours porter des lunettes de sécurité dans la zone de soudage. Utiliser des lunettes avec écrans lateraux dans les zones où l'on pique le laitier.

6. Eloigner les matériaux inflammables ou les recouvrir afin de prévenir tout risque d'incendie dû aux étincelles.

7. Quand on ne soude pas, poser la pince à une endroit isolé de la masse. Un court-circuit accidental peut provoquer un échauffement et un risque d'incendie.

8. S'assurer que la masse est connectée le plus prés possible de la zone de travail qu'il est pratique de le faire. Si on place la masse sur la charpente de la construction ou d'autres endroits éloignés de la zone de travail, on augmente le risque de voir passer le courant de soudage par les chaines de levage, câbles de grue, ou autres circuits. Cela peut provoquer des risques d'incendie ou d'echauffement des chaines et des câbles jusqu'à ce qu'ils se rompent.

9. Assurer une ventilation suffisante dans la zone de soudage. Ceci est particuliérement important pour le soudage de tôles galvanisées plombées, ou cadmiées ou tout autre métal qui produit des fumeés toxiques.

10. Ne pas souder en présence de vapeurs de chlore provenant d'opérations de dégraissage, nettoyage ou pistolage. La chaleur ou les rayons de l'arc peuvent réagir avec les vapeurs du solvant pour produire du phosgéne (gas fortement toxique) ou autres produits irritants.

11. Pour obtenir de plus amples renseignements sur la sûreté, voir le code "Code for safety in welding and cutting" CSA Standard W 117.2-1974.

PRÉCAUTIONS DE SÛRETÉ POUR LES MACHINES À SOUDER À TRANSFORMATEUR ET À REDRESSEUR

1. Relier à la terre le chassis du poste conformement au code de l'électricité et aux recommendations du fabricant. Le dispositif de montage ou la piece à souder doit être branché à une bonne mise à la terre.

2. Autant que possible, l'installation et l'entretien du poste seront effectués par un électricien qualifié.

3. Avant de faires des travaux à l'interieur de poste, la debrancher à l'interrupteur à la boite de fusibles.

4. Garder tous les couvercles et dispositifs de sûreté à leur place.

Mar. '93

NOTES

Return to Master TOC
Return to Master TOC
Return to Master TOC
Return to Master TOC

RETURN TO MAIN INDEX

TABLE OF CONTENTS

Page

Safety . . . . . **i - v**

Installation . . . . . **Section A**
Technical Specifications A-1
Safety Precautions A-2
Select Proper Location A-2
Input Connections A-2
Reconnect Procedure A-5
Connect Output Components A-7

Operation . . . . . **Section B**
Safety Instructions B-1
General Description B-1
Recommended Processes and Equipment B-2
Design Features and Advantages B-2
Machine Capability B-3
Limitations B-3
Controls and Settings B-4
Using the Wire Drive Roll B-5
Operating Steps B-7

Accessories . . . . . **Section C**
Replacement Magnum 250L Gun and Cable Assembly C-1
K607-1 Spool Gun Adapter Kit C-1
Installing the K607-1 Spool Adapter Kit C-1
Making a Weld with the Spool Gun Adapter (K607-1) Installed C-5
Timer Kit (K585-1) C-6
Timer Kit Installation (Optional K585-1) C-6
Making Spot and Stitch Welds with Timer Kit Installed C-7
Adjustable Gas Regulator and Hose Kit (K586-1) C-7
Drive Roll Kits C-7

Maintenance . . . . . **Section D**
Safety Precautions D-1
Routine and Periodic Maintenance D-1
Drive Rolls and Guide Tubes D-3
Drop-In Reel Spindle and Clips D-3
Cable Cleaning D-3
Gun Tubes and Nozzles D-3
Contact Tip and Gas Nozzle Installation D-3
Liner Removal and Replacement D-4
Liner Removal, Installation, and Trimming Instructions for Magnum 250L D-4
Gun Handle Disassembly D-5
Accessories and Expendable Replacement Parts for
Magnum 250L Gun and Cable Assemblies D-6

CONTINUED

vi

Return to Master TOC
Return to Master TOC
Return to Master TOC
Return to Master TOC

TABLE OF CONTENTS (continued)

Page

Theory of Operation . . . . . Section E
Power Supply Operation E-1
Thermal Protection E-5
SCR Operation E-6

Troubleshooting and Repair . . . . . Section F
How to use Troubleshooting Guide F-1
PC Board Troubleshooting Procedures F-2
Troubleshooting Guide F-3
Test Procedures F-10
Oscilloscope Waveforms F-22
Replacement Procedures F-27

Electrical Diagrams . . . . . .Section G

Parts List P-218

TABLE OF CONTENTS
- INSTALLATION SECTION -

INSTALLATION SECTION ..... Section A
Technical Specifications A-1
Safety Precautions A-2
Select Proper Location A-2
Stacking A-2
Tilting A-2
Input Connections A-2
Fuse and Wire Sizes A-3
Input Power Connections and Ground Connections ...A-3
Connect Shielding Gas A-4
Reconnect Procedure A-5
Connect Output Components A-7
Install the Work Clamp A-7
Output Polarity Connection A-7
Gun Liner and Contact Tip Installation A-7
Wire Size Conversion Parts A-8
Gun and Cable Installation A-8

Return to Master TOC
Return to Master TOC
Return to Master TOC
Return to Master TOC

Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC

TECHNICAL SPECIFICATIONS - Wire-Matic-250

INPUT - SINGLE PHASE/ 60 HERTZ ONLY	
Standard Voltage	**Input Current at Rated Output**
208/230/1/60	**53/49 Amps**
230/460/575	**50/25/20 Amps**

RATED OUTPUT		
Duty Cycle	**Amps**	**Volts at Rated Amps**
100%	145 amps	26
60%	200 amps	28
35%	250 amps	26

OUTPUT		
Current Range	**Maximum Open Circuit Voltage**	**Wire Speed Range**
30A - 250A	40V	50 - 600 IPM (1.27-15.2 m./minute)

RECOMMENDED INPUT WIRE & FUSE SIZE				
Input Voltage/ Frequency	**Fuse (Superlag) or Breaker Size**	**Type 75°C wire in Copper conduit AWG (IEC Sizes) Runs to 100ft. (30m.)**	**Runs over 100ft. (30m.)**	**Type 75°C Copper Ground Wire in Conduit**
208/60	60	8 (10mm²)	6 (16mm²)	10 (6mm²)
230/60	60	10 (6mm²)	8 (10mm²)	10 (6mm²)
460/60	30	14 (2.5mm²)	12 (4mm²)	10 (6mm²)
575/60	25	14 (2.5mm²)	12 (4mm²)	10 (6mm²)

PHYSICAL DIMENSIONS			
HEIGHT	**Width**	**DEPTH**	**WEIGHT (W/GUN)**
28.2” (719mm)	18.8” (480mm)	40.1” (1019mm)	220 lbs. (100 Kg.)

OPERATING TEMPERATURE	
STORAGE	**OPERATING**
± 40°C	-20°C to 40°C

Read entire Installation Section before installing the WIRE-MATIC 250

SAFETY PRECAUTIONS

⚠ WARNING

ELECTRIC SHOCK can kill.

- **Only qualified personnel should install this machine.**
- **Turn the input power OFF at the disconnect switch or fuse box before working on the equipment.**
- **Do not touch electrically hot parts.**
- **Always connect the WIRE-MATIC 250 grounding terminal to a good electrical earth ground through the cable plug per the National Electrical Code.**
- **Set the Wire-Matic 250 ON/OFF Power switch to the OFF position when connecting power cord to input power.**

SELECT PROPER LOCATION

Place the WIRE-MATIC 250 where clean, cooling air can freely circulate in through the case back louvers and out through the case front louvers. Dirt, dust, or any foreign material that can be drawn into the machine case back louvers should be kept at a minimum. Not following these precautions can result in the nuisance shutdown of the machine because of excessive operating temperatures.

STACKING

The WIRE-MATIC 250 cannot be stacked.

TILTING

The Wire-Matic 250 must be placed on a stable, level surface so it will not topple over. Do not place the machine on an incline.

INPUT CONNECTIONS

⚠ WARNING

All input power must be electrically disconnected before proceeding.

1. Before starting the installation, check with the local power company to determine if there is any question about whether your power supply is adequate for the voltage, amperes, phase, and frequency specified on the welder nameplate. Be sure the planned installation will meet the U.S. National Electrical Code and local code requirements. This welder may be operated from a single phase line or from one phase of a two or three phase line.

2. Models that have multiple input voltages specified on the nameplate (e.g., 208/230) are shipped connected for the highest voltage. If the welder is to be operated at a lower voltage, it must be reconnected according to the instructions on the inside of the removable panel (Reconnect Access Door) near the top left side of the Case Back Assembly. See the ***Reconnect Section*** of this manual for details on reconnecting the machine to operate at different voltages.

3. Be sure the voltage, phase, and frequency of the input power is as specified on the machine rating plate. See Figure A.1 for the location of the machine's input cord entry, Reconnect Access Door, and Rear Nameplate.

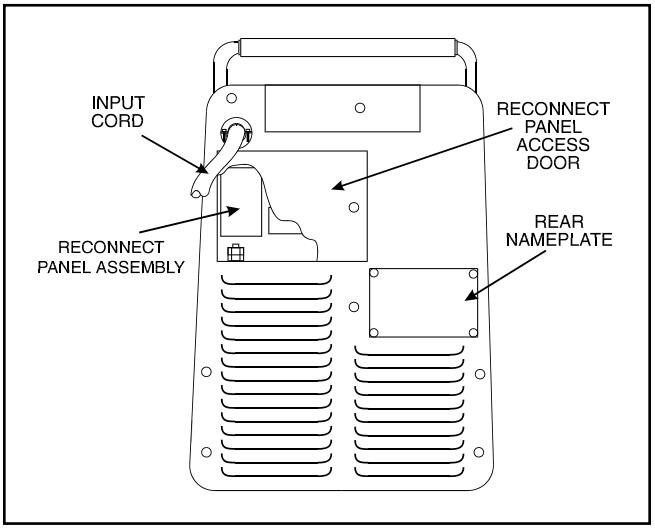


FIGURE A.1 - Case Back Assembly: Input Power Cable Entry Connections.

Return to Section TOC
Return to Master TOC

Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC

FUSE AND WIRE SIZES

Protect the input circuit with the super lag fuses or delay type circuit breakers listed on the ***Technical Specifications*** page of this manual for the machine being used. The tripping action of delay type circuit breakers decreases as the magnitude of the current increases. They are also called inverse time or thermal/magnetic circuit breakers.

DO NOT use fuses or circuit breakers with a lower amp rating than recommended. This can result in "nuisance" tripping caused by inrush current even when machine is not being used for welding at high output currents.

Use input and grounding wire sizes that meet local electrical codes or see the ***Technical Specifications*** page in this manual.

INPUT POWER CONNECTIONS AND GROUND CONNECTIONS

Have a qualified electrician connect the receptacle or cable to the input power lines and the system ground according to the U.S. National Electrical Code and any applicable local codes.

1. Follow the Input Supply Connection Diagram on the inside of the Reconnect Panel Access Door.

2. Use a single-phase line or one phase of a three-phase line.

For the 208V/230V/ 60 HZ model WIRE-MATIC 250 shipped with a 10 ft. input cord and plug connected to the welder, mount the matching receptacle supplied with the machine.

1. Mount the receptacle in a suitable location using the screws provided.

2. Locate the receptacle within reach of the 10 ft. input cord attached to the welder.

3. Mount the receptacle with the grounding terminal at the top. This allows the power cable to hang down without bending. See Figure A.2.

   a. The center terminal in the receptacle is for the grounding connection.

   b. Fuse the two hot lines of the receptacle with super lag type fuses as shown in Figure A.2. A green wire in the input cord connects this terminal to the frame of the welder. This ensures proper grounding of the welder frame when the welder plug is inserted into the receptacle.

4. Use proper wire sizes. See the ***Technical Specification*** table for proper wire sizes. For cable lengths over 100 feet, larger copper wires should be used.

⚠ CAUTION

Connect to a system grounding wire. See the United States National Electrical Code and local codes for other details and means for proper grounding.

Connect to hot wires of a three-wire, single phase system or to one phase of a two or three phase system.

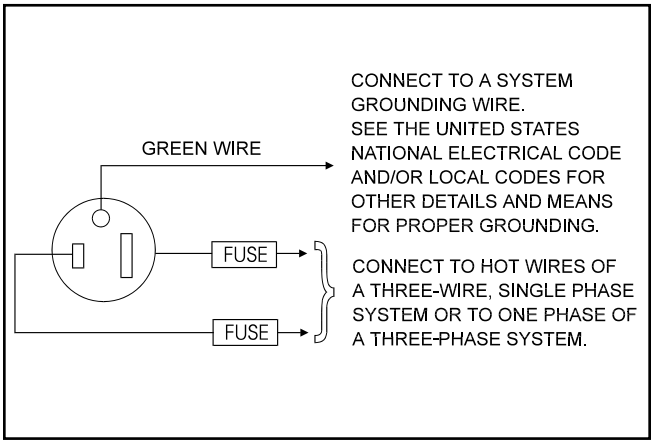

GREEN WIRE
FUSE
FUSE
CONNECT TO A SYSTEM GROUNDING WIRE. SEE THE UNITED STATES NATIONAL ELECTRICAL CODE AND/OR LOCAL CODES FOR OTHER DETAILS AND MEANS FOR PROPER GROUNDING.
CONNECT TO HOT WIRES OF A THREE-WIRE, SINGLE PHASE SYSTEM OR TO ONE PHASE OF A THREE-PHASE SYSTEM.

FIGURE A.2. - Ground Connections.

For the 230/460/575V/ 60 HZ model which is not equipped with a plug, an input cord, or a receptacle, the input power supply leads must be connected directly to the Reconnect Panel as shown in Figure A.3. Refer to ***Technical Specifications*** at the beginning of this chapter for proper wire sizes.

1. Connect the input power leads to terminals L1 and L2 on the Reconnect Panel Assembly.

   a. For input power supply leads of 10 AWG or smaller are used, connect leads to Reconnect Panel using the ferrules (S19117-1) provided.

   b. Strip 1/2" (13mm) of insulation from the input power supply leads.

   c. Place ferrule over wire.

   d. Torque the terminal screws to 16 in.-lbs. (1.8nm).

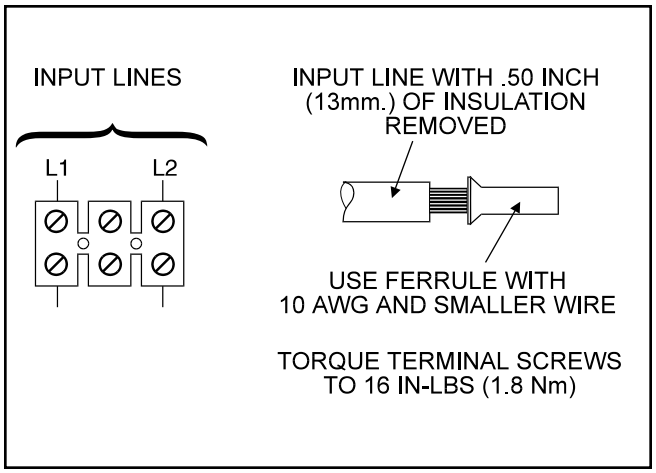

INPUT LINES
L1
L2
INPUT LINE WITH .50 INCH (13mm.) OF INSULATION REMOVED
USE FERRULE WITH 10 AWG AND SMALLER WIRE
TORQUE TERMINAL SCREWS TO 16 IN-LBS (1.8 Nm)

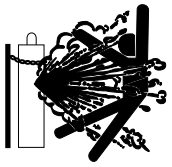
FIGURE A.3 - Input Power Connection For 230/460/575 Volt Models.

CONNECT SHIELDING GAS

Customer must provide cylinder of appropriate type of shielding gas for gas metal arc welding for the process being used. See Figure A.4 for the location of the components used to connect the air supply cylinder.

NOTE: For CO_2 or Argon blend gas, the optional K586-1 Adjustable Gas Regulator and Hose Kit should be used. See ***Accessories Section*** of this manual.

⚠ WARNING



Gas under pressure is explosive. Always keep gas cylinders in an upright position and always keep chained to undercarriage or stationary Y support. See American National Standard Z-49.1, "Safety in Welding and Cutting" published by the American Welding Society.

1. Set the gas cylinder on the rear platform of the WIRE-MATIC 250.

2. Hook the chain in place to secure cylinder to rear of welder.

3. Remove the cylinder cap.

4. Inspect the cylinder valves for damaged threads, dirt, dust, oil or grease.

   a. Remove dust and dirt with a clean cloth.

NOTE: DO NOT ATTACH THE REGULATOR IF OIL, GREASE OR DAMAGE IS PRESENT! Inform your gas supplier of this condition. Oil or grease in the presence of high pressure oxygen is explosive.

5. Stand to one side away from the outlet and open the cylinder valve for an instant to blow away any dust or dirt which may have accumulated in the valve outlet.

BE SURE TO KEEP YOUR FACE AWAY FROM THE VALVE OUTLET WHEN OPENING THE VALVE.

6. Inspect the regulator for damaged threads, dirt, dust, oil or grease.

   a. Remove dust and dirt with a clean cloth.

NOTE: DO NOT USE THE REGULATOR IF OIL, GREASE OR DAMAGE IS PRESENT! Have an authorized repair station clean the regulator or repair any damage.

Return to Section TOC
Return to Master TOC

Return to Section TOC
Return to Master TOC

7. Attach the flow regulator to the cylinder valve and tighten the union nut(s) securely with a wrench.

   a. NOTE: If connecting the flow regulator to 100% CO_2 cylinder, insert the regulator adapter provided with the optional K-586-1 Kit between the regulator and cylinder valve. If adapter is equipped with a plastic washer, be sure it is seated properly to connect to the CO_2 cylinder.

8. Connect one end of the inlet gas hose to the outlet fitting of the flow regulator.

9. Connect the other end of the inlet gas hose to the WIRE-MATIC 250 rear fitting.

10. Tighten both the union nuts securely with a wrench.

11. Before opening the cylinder valve, turn the regulator adjusting knob counter-clockwise until the pressure is released from the adjusting spring.

12. Open the cylinder valve slowly a fraction of a turn.

   a. When the cylinder pressure gage pointer stops moving, open the valve fully.

NEVER STAND DIRECTLY IN FRONT OF OR BEHIND THE FLOW REGULATOR WHEN OPENING THE CYLINDER VALVE. ALWAYS STAND TO ONE SIDE.

NOTE: The Optional K586-1 flow regulator is adjustable. Adjust the flow regulator for the flow rate recommended for the procedure and process being used before making the weld.

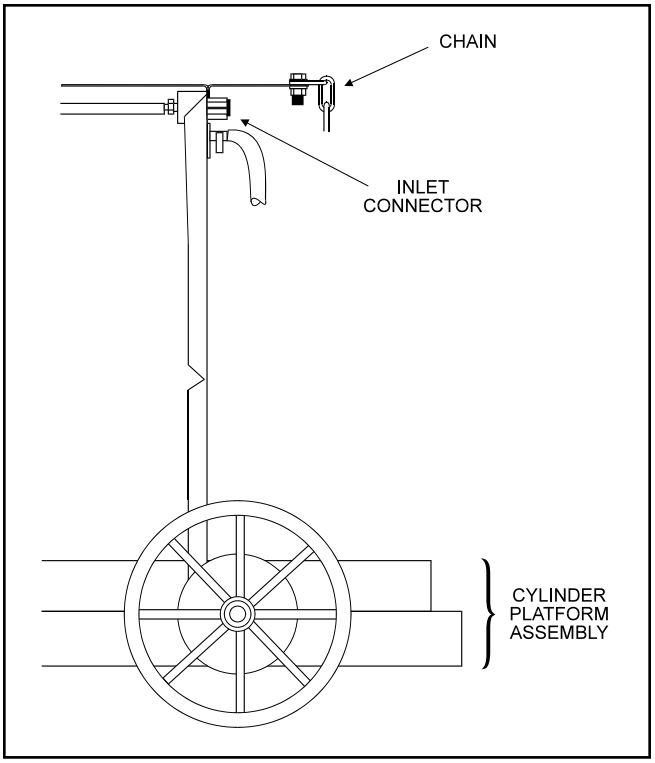


FIGURE A.4 - Input Air Supply Connections

RECONNECT PROCEDURE

Multiple voltage machines are shipped connected to the highest input voltage listed on the machine's rating plate. Before installing the machine, check that the Reconnect Panel in the Input Box Assembly is connected for the proper voltage.

⚠ CAUTION

Failure to follow these instructions can cause immediate failure of components within the machine.

To reconnect a dual or triple voltage machine to a different voltage, change the position of the leads or links on the Reconnect Panel based on the type of machine. Follow The Input Supply Connection Diagram located on the inside of the Case Back Reconnect Panel Access Door.

For 208/230/1/60 machine(s), see Figure A.5.

For 230/460/575/1/60 machine(s), see Figure A.6.

ALL MACHINES ARE SHIPPED FROM THE FACTORY CONNECTED FOR THE HIGHER OF THE TWO INPUT VOLTAGES LISTED ON THE NAMEPLATE. TO CHANGE VOLTAGE CONNECTION PROCEED AS FOLLOWS:

1. REMOVE THE OUTER STEEL HEX NUT FROM THE TERMINAL WHERE THE TRANSFORMER INPUT LEAD IS CONNECTED.
2. SHIFT THE TRANSFORMER INPUT LEAD TO THE TERMINAL THAT THE UNIT IS TO OPERATE ON AND FASTEN SECURELY WITH THE HEX NUT REMOVED IN STEP1. (MAKE CERTAIN THAT BRASS NUTS ARE TIGHT.)

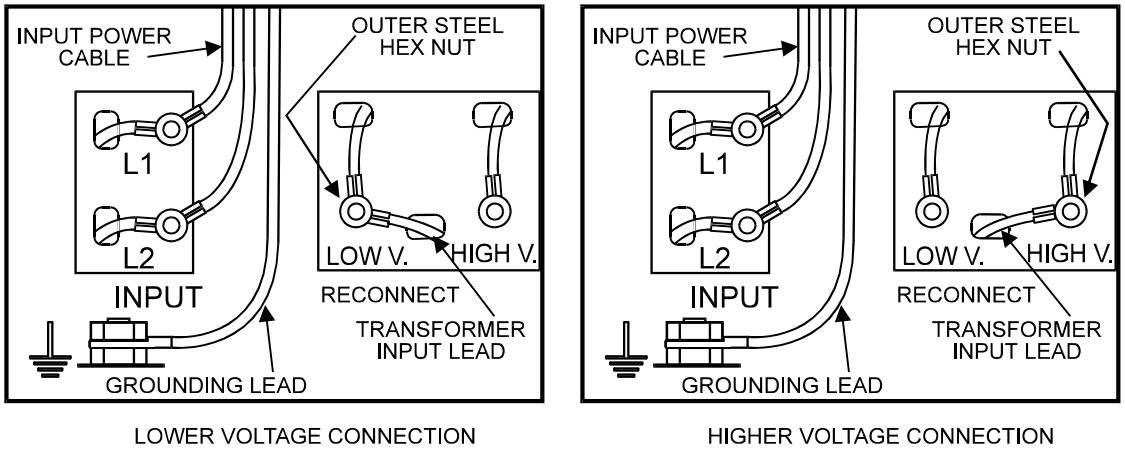


FIGURE A.5 - Reconnect Diagram For 208/230/1/60 Machines.

1. ALL MACHINES ARE SHIPPED FROM THE FACTORY CONNECTED FOR THE HIGHEST NAME-PLATED SINGLE PHASE INPUT VOLTAGE. TO CHANGE CONNECTIONS FOR A DIFFERENT INPUT VOLTAGE, RECONNECT BOTH COPPER JUMPERS PER DIAGRAM BELOW. ALWAYS CONNECT JUMPERS BETWEEN OUTER STEEL NUT AND INNER BRASS NUT ON TERMINAL STUDS.
2. CONNECT THE INPUT POWER TO THE INPUT TERMINAL BLOCK, L1 AND L2 AT THE UPPER CORNER OF THE PANEL. FOR INPUT LEADS 10AWG AND SMALLER USE FERRULES PROVIDED. TORQUE TO 16 IN-LBS.
3. CONNECT A GROUNDING LEAD TO THE GROUND STUD (⏚) ON THE MACHINE NEAR THE TERMINAL BLOCK.

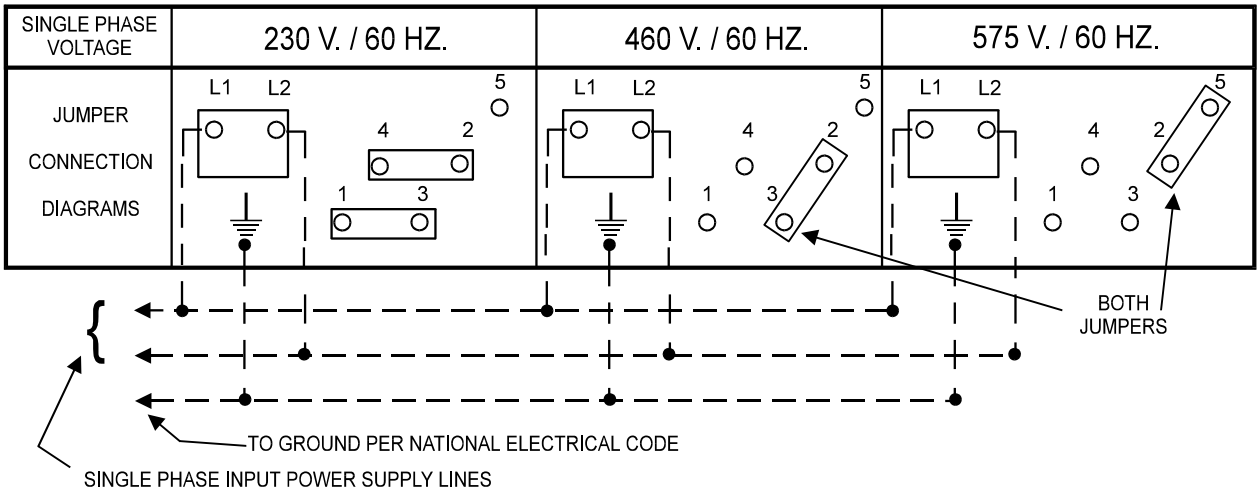


FIGURE A.6 - Reconnect Diagram For 230/460/575/1/60 Machine.

Return to Section TOC
Return to Master TOC

Return to Section TOC
Return to Master TOC

CONNECT OUTPUT COMPONENTS

INSTALL THE WORK CLAMP

Attach the work clamp to the cable which extends from the front of the machine using the following procedure:

1. Insert the lug on the end of the work cable through the strain relief hole in the work clamp handle. See Figure A.7.

2. Slide the work cable through the hole up to the bolt and nut.

3. Fasten work cable using the bolt and nut provided.

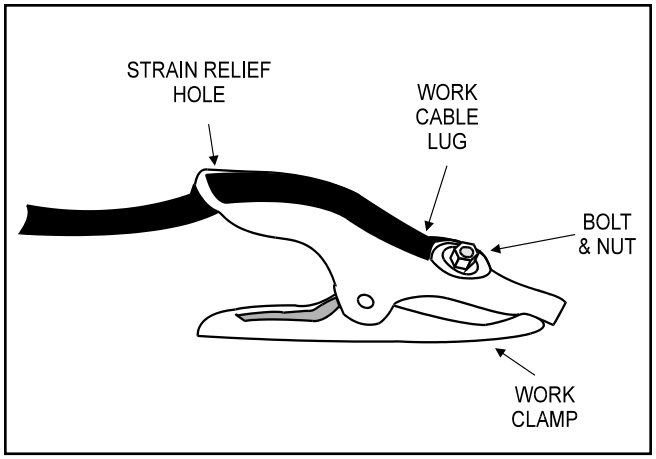


FIGURE A.7 - Installing The Work Clamp.

OUTPUT POLARITY CONNECTION

⚠ WARNING

Turn the welder Power Switch OFF before changing output connection.

The welder is shipped from the factory connected for electrode positive (+) polarity. This is the normal polarity for GMA welding.

If negative (-) polarity is required, interchange the connection of the two cables located in the wire drive compartment near the front panel. The negative lead is the lead closest to the front panel (where the leads come out of the floor of the compartment) and should be reconnected to the brass conductor tube of the gun connector. The positive lead is stamped (+) on its terminal and should be reconnected to the work lead terminal.

GUN LINER AND CONTACT TIP INSTALLATION

The Magnum 250L gun and cable provided with the WIRE-MATIC 250 is factory installed with a liner for a .035-.045" (0.9-1.2mm) diameter electrode and an .035" (0.9mm) contact tip.

1. If a .045" diameter wire size is to be used, install the .045" contact tip (also provided).

2. For other wire sizes, use the following procedure for contact tip and gas nozzle installation. See Figure A.8.

   a. Choose the correct size contact tip for the electrode being used (wire size is stenciled on the side of the contact tip) and screw it snugly into the gas diffuser.

   b Be sure the nozzle insulator is fully screwed onto the gun tube and does not block the gas holes in the diffuser.

   c. Slip the appropriate gas nozzle onto the nozzle insulator. Either a standard .50" (12.7mm) or optional .62" (15.9mm) I.D. slip-on gas nozzle may be used and should be selected based on the welding application.

   d. Adjust the gas nozzle for the GMAW process to be used.

For the short-circuiting transfer process, the contact tip end should be flush to extended to .12" (3.2mm). See Figure A.8.

For the spray transfer process, the contact tip should be flush to recessed .12" (3.2mm). See Figure A.8.

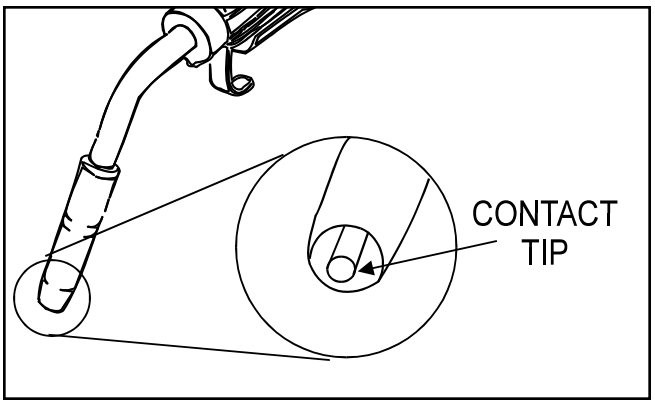


FIGURE A.8 - Contact Tip and Electrode Connections.

Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC

WIRE SIZE CONVERSION PARTS

The Wire-Matic 250 is rated to feed .025" through .045" (0.6-1.2mm) solid or cored electrode sizes. For various drive roll kits refer to ***Acessories Section***.

GUN AND CABLE INSTALLATION

⚠ WARNING

Turn the welder Power Switch OFF before changing output connection.

1. Lay the cable out straight.

2. Locate the wing screw on conductor block inside wire feed compartment. Unscrew it until the tip of the screw no longer protrudes into gun opening as seen from front of machine.

3. Insert the brass connector on the end of the gun cable into conductor block through opening in the front panel. Make sure the connector is fully inserted and tighten wing screw.

4. Connect the gun trigger connector from the gun and cable to the mating receptacle on the front panel. Make sure that the keyways are aligned, insert and tighten retaining ring.

NOTE: If a gun and cable other than the Magnum 250L is used, it must conform to connector specifications and the gun trigger switch must be capable of switching 5 milliamps at 15 volts DC -resistive.

⚠ CAUTION

The gun trigger switch connected to the gun trigger control cable must be a normally open, momentary switch. The terminals of the switch must be insulated from the Welding circuit. Improper operation of or damage to the WIRE-MATIC 250 might result if this switch is common to an electrical circuit other than the WIRE-MATIC 250 trigger circuit.

Return to Section TOC
Return to Master TOC

NOTES

TABLE OF CONTENTS
- OPERATION SECTION -

OPERATION SECTION ..... Section B
Safety Instructions.....B-1
General Description.....B-1
Recommended Processes and Equipment.....B-2
Design Features and Advantages.....B-2
Unit Features.....B-2
Power Source Features.....B-2
Wire Feeder Features B-3
Machine Capability.....B-3
Limitations B-3
Controls and Settings.....B-4
Using the Wire Drive Roll.....B-5
Procedure for Changing Drive Roll B-5
Loading the Wire Reel.....B-5
Feeding Electrode B-6
Proper Wire Feeding B-6
Setting Idle Roll Pressure.....B-7
Operating Steps B-7
Starting the Welder.....B-7
Changing Run-In Mode B-7
Enter Fast Run-In Mode B-7
Enter Slow Run-In Mode.....B-7
Making a Weld.....B-8

Return to Master TOC
Return to Master TOC
Return to Master TOC
Return to Master TOC

Read and understand this entire section before operating your WIRE-MATIC 250.

SAFETY INSTRUCTIONS

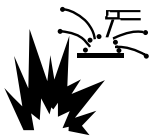
⚠ WARNING

ELECTRIC SHOCK can kill.

- **Do not touch electrically live parts such as output terminals or internal wiring.**
- **Insulate yourself from the work and ground.**
- **Always wear dry insulating gloves.**

FUMES AND GASES can be dangerous.

- **Keep your head out of fumes.**
- **Use ventilation or exhaust to remove fumes from breathing zone.**



WELDING, CUTTING and GOUGING SPARKS can cause fire or explosion

- **Keep flammable material away.**
- **Do not weld, cut or gouge on containers that have held combustibles.**

ARC RAYS can burn.

- **Wear eye, ear and body protection.**

Only qualified personnel should operate this equipment. Observe all safety information throughout this manual.

⚠ CAUTION

When using a Wire-Matic 250 power source there will be a small spark if the electrode contacts the work or ground within several seconds after releasing the trigger.

GENERAL DESCRIPTION

The WIRE-MATIC 250 is a complete semiautomatic constant voltage DC arc welding machine built to meet NEMA specifications. It combines a constant voltage power source, a constant speed wire feeder, and a microcomputer-based controller to form a reliable high-performance welding system.

Simple controls, consisting of continuous full range calibrated voltage control and wire feed speed control, provide versatility with ease of use.

Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC

Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC

RECOMMENDED PROCESSES AND EQUIPMENT

The WIRE-MATIC 250 is recommended for GMA welding processes using 10 to 30 lb. (4.5 to 13.6 kg) 2" (51mm) I.D. spools or Readi-Reel coils (with optional adapter) of:

.025" through .045" (0.6-1.2mm) solid steel.
.035" (0.9mm) stainless steel.
3/64" (1.2mm) aluminum.
.045" (1.2mm) Outershield.
.035" (0.9mm) and .045" (1.2mm) Innershield self-shielding electrodes.

The WIRE-MATIC 250 is factory equipped to feed .035" (0.9mm) and .045" (1.2mm) electrodes. It includes a 12 ft. (3.6m) GMAW gun and cable assembly equipped for these wire sizes with a duty cycle rating of 200A, 60% or 250A, 35%. Using GMAW processes requires use of the optional gas regulator and a supply of shielding gas.

DESIGN FEATURES AND ADVANTAGES

UNIT FEATURES:

Continuous Voltage and Wire Speed Control - Large, easy to use control knobs provide continuous full-range calibrated control of both wire speed and voltage. A "ready-reference Procedure Chart" is provided on the inside of the wire drive section door giving suggested settings for popular welding processes and plate thickness. Wire speed control has fine resolution calibrated dial for repeatable and precise setting.

Undercarriage for Hand Mobility - Heavy duty 10" (254mm) wheels and 4" (102mm) casters are factory installed. The handle can be used for storing the welding gun and work cable.

Gas cylinder Platform - Factory installed on the undercarriage, it permits platform mounting and support of a single gas cylinder. It is not necessary to completely lift the gas cylinder when placing it on the platform.

Easy Accessibility - The innovative, small door on the wire feeder enclosure protects wire and wire drive from dirt, dust, and damage. However, the door allows easy top access for convenient "drop-in" wire reel loading or to service the wire drive.

POWER SOURCE FEATURES:

10 Ft. (3.0m) Input Power Cable - Includes plug and mating receptacle for 208/230V unit. Convenient rear reconnect panel allows easy access for 208V re-connection.

Power Switch - Front panel toggle switch turns input power on and off.

Pilot Light - Indicates when power is applied to machine.

Thermostatically-Controlled Fans - Cools transformer and other components only when required. The fan motors stays off when used intermittently or at low current procedures, reducing the amount of dust and dirt drawn into the machine. This also reduces power consumption.

Electronic Overload Protection - Protects machine from short circuit or high current overloading.

Power Source Line Voltage Regulation - Precise SCR phase control circuit holds the voltage setting at a constant level to maintain weld quality even when the input voltage fluctuates +/- 10%.

Solid State Contactor -Output is turned on and off by SCR's instead of a mechanical contactor providing extra long life in highly repetitive welding applications.

Output Terminals - Easily accessible in wire drive compartment for quick cable connection and polarity reversal.

Work Cable - 10 ft. (3.0m) long with work clamp.

Return to Section TOC
Return to Master TOC

WIRE FEEDER FEATURES:

Drop-in Wire Loading - The innovative spindle snaps into the Readi-Reel adapter (optional) or most any 2" (51mm) I.D. wire spool. The wire spindle drops into the top-loading WIRE-MATIC 250 case design. Accommodating standard 12" (305mm) and 8" (203mm) diameter coils, the unique spindle and support design automatically provides appropriate de-reeling drag to prevent wire reel overrun and loop-offs without manual brake adjustment.

Tachometer Controlled Wire Drive - Precision control of permanent magnet motor provides proper wire feed acceleration and speed accuracy, independent of fluctuations in line voltage and wire loading. This gives reliable arc starting and weld consistency.

Low Speed Start - When the trigger is pulled, the wire feeder feeds wire at low speed regardless of the set wire feed speed until welding current is drawn or 2 seconds has expired. This feature enhances starting and makes setting stickout easy. The 2 second limit permits high speed loading of the gun and cable. In later versions of the WIRE-MATIC 250, a user selectable feature allows the wire feeder to feed wire directly at the set speed, thus bypassing the 2 second slow start.

Solid State Overload Protection - No circuit breaker to reset. Simply pull the trigger to resume welding once the overload condition has been cleared.

Unique Drive Roll and Guide Tube Design - Precisely aligned guide tubes and drive rolls provide long life. The design also permits quick reload by simply starting wire into ingoing guide tube. Adjustable tension setting minimizes 'birdnesting', eliminates milling through the wire, and gives positive feeding. The double groove, reversible drive roll included with the WIRE-MATIC 250 allows use of .030" (0.8mm) through .045" (1.2mm) diameter wire. Drive roll kits for other sizes and types of wire are also available.

Quick-Connect Welding Gun - Gun connector has integrated welding power and gas connection with separate front-panel twist-lock trigger connection mount.

Gun and Cable - A 12 ft. (3.6m) GMAW gun and cable assembly, rated 200 amps 60% duty, or 250 amps 35% duty, is provided with the WIRE-MATIC 250. A liner, diffuser and contact tips for .035" (0.9mm) and .045" (1.2mm) electrodes are included.

MACHINE CAPABILITY

The WIRE-MATIC 250 is rated on the following duty cycles based on a 10-minute time period (i.e., for 60% duty cycle, it is 6 minutes on and 4 minutes off).

Duty Cycle	Amps.	Volts
100%	145	26
60%	200	28
35%	250	26

LIMITATIONS

The WIRE-MATIC 250 may not operate satisfactorily if powered with a portable or in-plant generating system.

CONTROLS AND SETTINGS

All operator controls are located on the Front Panel/Nameplate of the machine. See Figure B.1 for the location of each control.

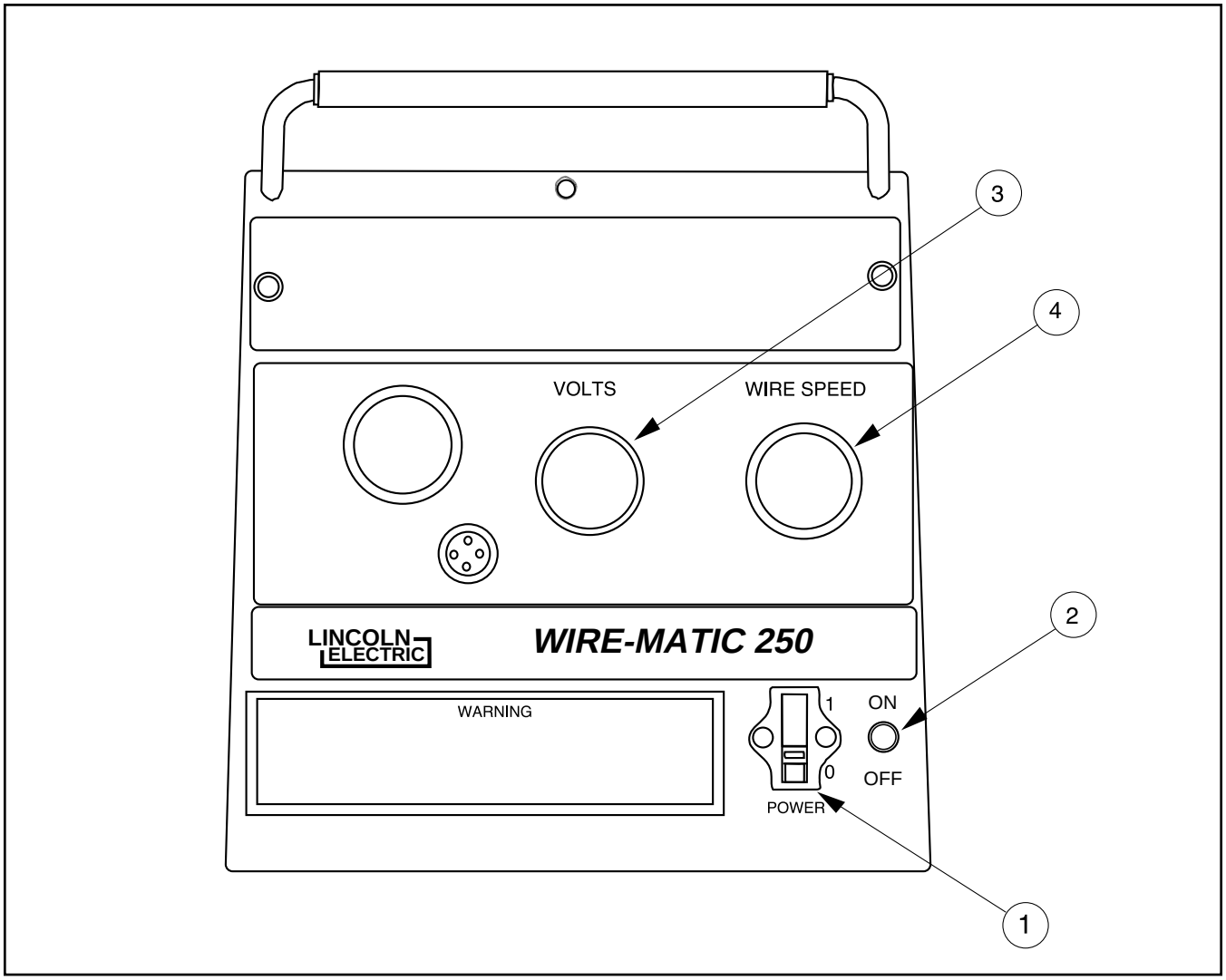


Figure B.1 - Operator Controls.

1. **POWER SWITCH:** Toggle switch to turn input power ON and OFF. Place the lever in the ON position to turn the WIRE-MATIC 250 ON.

2. **PILOT LIGHT:** The red LED pilot light located next to the POWER SWITCH is lit when the power is ON.

3. **VOLTAGE CONTROL POTENTIOMETER KNOB:** Provide continuous adjustment of power source output voltage over the rated 12 to 28 volt range. Voltage can be adjusted while welding.

4. **WIRE SPEED CONTROL POTENTIOMETER KNOB:** Controls the wire speed from 50 to 600 inches per minute (1.2 to 15.2 m/min). The control can be preset on the dial to the setting specified on the Procedure Decal on the inside of the wire compartment door. Wire speed is not affected when changes are made in the voltage control.

NOTE: When the trigger is pulled, the wire feeder feeds wire at low speed regardless of the wire feed speed set on the control until the welding arc starts or 2 seconds has elapsed. This feature enhances starting and makes it easier to set the stickout. The 2 second limit permits high speed loading of the gun and cable.

Return to Section TOC
Return to Master TOC

Return to Section TOC
Return to Master TOC

USING THE WIRE DRIVE ROLL

The drive roll provided with the WIRE-MATIC 250 has two grooves, one for.030-.035" (0.8-0.9mm) solid steel electrode, and the other for .045" (1.2mm) solid steel electrode. The welder is shipped with the drive roll installed in the .030-.035" (0.8-0.9mm) position as indicated by the stenciling on the exposed side of the drive roll. If .045" (1.2mm) electrode is to be used or one of the optional drive rolls is required, then the drive roll must be reversed or changed per the following instructions. This information also appears on the Procedure Decal on the door inside the wire compartment.

PROCEDURE FOR CHANGING DRIVE ROLL

Different wire sizes may require changing the drive roll. The applicable wire sizes are stamped on the drive roll. Dual groove rolls must be installed so the side with the proper wire size stamp faces out.

1. Turn POWER SWITCH to OFF.
2. Release the pressure on the idle roll by swinging the pressure arm off the idle roll arm.
3. Remove the wire from the drive system.
4. Remove the wing screw from the drive roll.
5. Turn the drive roll over or change to another roll as required.
6. Replace the wing screw.
7. Check that the gun liner and contact tip are properly sized for wire being used.

LOADING THE WIRE REEL

To mount a 22-30 lb. (10-14 kg) Readi-Reel package using the optional Readi-Reel Adapter (K363P):

1. Pull the spindle up out of the WIRE-MATIC 250 spindle mounting clips (V-brackets).
2. Snap the spindle into the Readi-Reel adapter so the spindle drive pin is engaged with the hole provided in the Adapter.
3. Rotate the spindle and adapter so the retaining spring is at the 12 o'clock position.
4. Position the Readi-Reel so that it will rotate in a counterclockwise direction (as viewed from retaining spring side of Adapter) when wire is dereeled from the top of the coil as shown in Figure B.2.

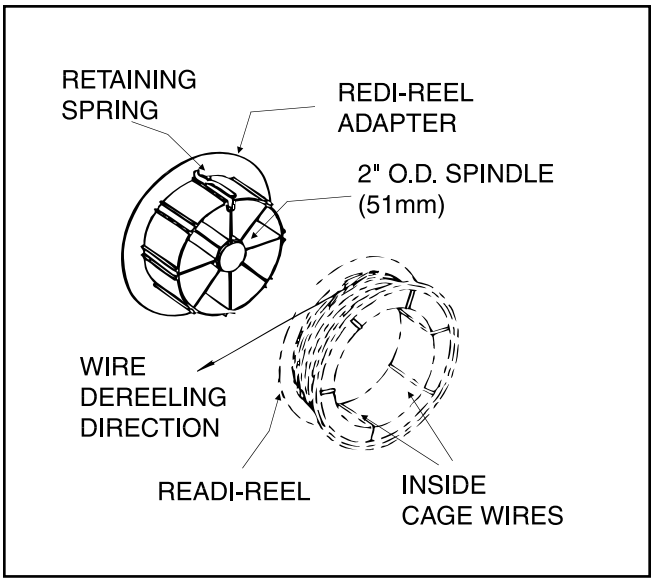


FIGURE B.2 - Wire Reel Loading.

5. Set one of the Readi-Reel inside cage wires on the slot in the retaining spring tab.
6. Lower the Readi-Reel to depress the retaining spring and align the other inside cage wires with the grooves in the molded adapter.
7. Slide the cage all the way onto the adapter until the retaining spring "pops" up fully.

⚠ WARNING

Check to be sure the retaining spring has fully returned to the locking position and has securely locked the Readi-reel cage in place. Retaining spring must rest on the cage not the welding electrode.

8. Check that the mating surfaces of the spindle hubs and spindle mounting clips (V-brackets) are clear of dirt and debris, and that the adapter is fully engaged onto the spindle.
9. Lower the loaded spindle into the spindle mounting clips (V-brackets) so wire dereels from top of coil toward wire drive.

NOTE: The retaining spring side of the adapter should be facing the center (inner) panel of the WIRE-MATIC 250.

10. Remove Readi-Reel from Adapter by depressing the retaining spring tab with thumb while pulling the Readi-Reel cage from the molded adapter with both hands. Do not remove adapter from spindle.

To mount 10 to 30 lb. spools (8" and 12" diameter):

1. Remove the optional Readi-Reel adapter from the 2 inch dia. spindle, if installed.

2. Check the mating surfaces of the spindle hubs and spindle mounting clips (V-brackets) to be sure they are clear of dirt and debris.

3. Place the spool on the spindle. Make certain the brake driving pin enters one of the holes in the back side of the spool.

4. Lower the loaded spindle into the spindle mounting clips (V-brackets) so the wire dereels from the top of the reel toward the wire drive.

NOTE: The WIRE-MATIC 250 Spindle was designed to mount 12" (300mm) and 8" (200mm) diameter spools meeting international spool size specifications. If the spool being used is too narrow to keep the brake driving pin* engaged with the spool pin hole, a 2" (51mm) I.D. shim washer could be used between the spool and the spindle retaining clip to take up the space.

* Later spindle design uses a longer D-shaped pin to assure engagement.

FEEDING ELECTRODE

⚠ WARNING

When inching, the electrode and drive mechanism are electrically hot to work and ground. The electrode remains hot several seconds after the gun trigger is released.

NOTE: Check that the proper drive rolls and gun parts for the wire size and type are being used.

1. Turn the Readi-Reel or spool until the free end of the electrode is accessible.

2. Tightly holding the electrode, cut off the bent end and straighten the first six inches.

   a. If the electrode is not properly straightened, it may not feed properly into the outgoing guide tube or welding gun causing a "birdnest.")

3. Cut off the first inch.

4. Push the wire through the ingoing guide tube.

5. Press the gun trigger and push the electrode into the drive roll.

   a. If the electrode fails to thread itself into the outgoing guide tube of the wire drive

   - open the quick release idle roll arm
   - thread the electrode manually
   - re-close the arm.

6. Inch the electrode through the gun.

NOTE: Due to the low speed starting feature of the WIRE-MATIC 250, the wire will feed at low speed for 2 seconds while inching, then come up to the set speed. To change run-in mode, see the ***Changing the Run In Mode Section***.

PROPER WIRE FEEDING

Wire feeding problems can be avoided by observing the following gun handling procedures:

- Do not kink or pull cable around sharp corners.
- Keep the electrode cable as straight as possible when welding or loading electrode through cable.
- Do not allow dolly wheels or trucks to run over cables.
- Keep cable clean by following maintenance instructions.
- Use only clean, rust-free electrode. The Lincoln electrodes have proper surface lubrication.
- Replace contact tip when the arc starts to become unstable or the contact tip end is fused or deformed.
- Keep drop-in spindle and spindle mounting clip contacting surfaces clear of dirt and debris.

Return to Section TOC
Return to Master TOC

Return to Section TOC
Return to Master TOC

SETTING IDLE ROLL PRESSURE

The idle roll pressure wing screw is set at the factory backed out 2-1/2 turns from full pressure. This is an approximate setting. The optimum idle roll pressure varies with type of wire, wire diameter, surface conditions, lubrication, and hardness. As a general rule, hard wires may require greater pressure, and soft, or aluminum wire, may require less pressure than the factory setting. The optimum idle roll setting can be determined as follows:

1. Push the end of gun against a solid object that is electrically isolated from the welder output.

2. Press the gun trigger for several seconds.

   a. If the wire "birdnests", jams, or breaks at the drive roll, the idle roll pressure is too great. Back the wing screw out 1/2 turn, run new wire through gun, and repeat steps 1 and 2.

   b. If the drive roll slips, loosen the wing screw on the conductor block and pull the gun cable forward about 6" (15 cm). There should be a slight waviness in the exposed wire. If there is no waviness, the pressure is too low. Tighten the wing screw 1/4 turn, reinstall the gun cable, and repeat steps 1 and 2.

OPERATING STEPS

⚠ WARNING

Before operating the machine, be sure you have all the materials needed to perform the work. Be sure you are familiar with and have taken all possible safety precautions before starting the work. It is important that you follow these operating steps each time you use the machine.

STARTING THE WELDER

1. Turn the POWER switch to ON. This illuminates the red LED pilot light.

2. Select the correct voltage and wire speed for the welding process required.

3. Operate the gun trigger for welder output and to energize the wire feeder motor.

NOTE: When the POWER SWITCH is ON, the fan motor is thermostatically controlled to provide cooling for the transformer and other components only when the machine needs cooling. When the machine does not require fan cooling the fan does not run, such as when first turned on, when welding at low current, or at low duty cycle procedures.

CHANGING RUN-IN MODE (Later models only)

The WIRE-MATIC 250 is factory set for slow run-in mode. This means the machine will initially feed wire at 50 IPM until output current is sensed or for 2.0 seconds, whichever occurs first. After which it will accelerate to the preset wire feed speed.

In the Fast run-in mode, the machine will accelerate directly to the preset wire feed speed.

ENTER FAST RUN-IN MODE

1. Turn POWER SWITCH to OFF on front panel of WIRE-MATIC 250.

2. Turn the WIRE SPEED CONTROL POTENTIOMETER KNOB fully clockwise to maximum.

3. Close the gun trigger switch and turn the POWER SWITCH to ON.

   a. The gas solenoid will actuate four times to signal that the unit has entered the fast run-in mode. The gun trigger need only be closed until the first gas solenoid actuation is heard.

NOTE: Arc starting characteristics may be effected when using the fast run-in mode since normal starting processes are being overridden.

ENTER SLOW RUN-IN MODE

1. Turn POWER SWITCH to OFF on front panel of WIRE-MATIC 250.

2. Turn the WIRE SPEED CONTROL POTENTIOMETER KNOB fully counterclockwise to minimum.

3. Close the gun trigger and turn the POWER SWITCH to ON.

   a. The gas solenoid will actuate two times to signal that the unit has entered the slow run-in mode. The gun trigger need only be closed until the first gas solenoid actuation is heard.

NOTE: The unit will remember the run-in mode from the previous power down and return you to that same state the next time you power up. Therefore, it is not necessary to repeat either of the above procedures each time the unit is powered up. You need only perform one of the above procedures when you want to change the run-in mode.

NOTE. When the gun trigger is first closed before turning on the welder, there is no output power or wire feed until the trigger is opened and re-closed, regardless of the WIRE SPEED CONTROL POTENTIOMETER KNOB setting.

MAKING A WELD

1. Check that the electrode polarity is correct for the process being used.

2. Turn the POWER SWITCH to ON.

3. Set desired arc voltage and wire speed for the electrode wire, material type and thickness, and gas (for GMAW) being used.

NOTE: Use the Application Chart on the door inside the wire compartment as a quick reference for some common welding procedures.

NOTE: If Timer Kit is installed, see the Accessories Section of this manual to select the desired mode and for additional welding information Spot and Stitch modes.

4. Inch the electrode through the gun and cable.

5. Cut the electrode within approximately 3/8" (10mm) of the end of the contact tip or 3/4" (20mm) for Outershields.

NOTE: When the trigger is pulled, the wire feeder feeds wire at low speed regardless of the set wire feed speed until the welding arc starts or 2 seconds has elapsed. This feature enhances starting and makes it easier to set the stickout. The 2 second limit permits high speed loading of the gun and cable. To change run-in mode, refer to ***Changing Run In Mode Section***.

6. If welding gas is to be used, turn on the gas supply and set the required flow rate (typically 25-35 CFH; 12-16 Liters/min).

NOTE: When using Innershield electrode, the gas nozzle may be removed from the insulation on the end of the gun. This will give improved visibility and eliminate the possibility of the gas nozzle overheating.

7. Connect the work cable to metal to be welded. Work clamp (if used) must make good electrical contact to the work. The work must be grounded.

⚠ WARNING

When using an open arc process, it is necessary to use correct eye, head and body protection.

8. Position electrode over joint. End of electrode may be lightly touching the work.

9. Lower welding helmet, close gun trigger, and begin welding. Hold the gun so the contact tip to work distance is about 3/8 inch (10mm) or 3/4" (20mm) for Outershield.

10. To stop welding, release the gun trigger and then pull the gun away from the work after the arc goes out.

11. When no more welding is to be done, close the valve on gas cylinder (if used), momentarily operate gun trigger to release gas pressure.

12. Turn POWER SWITCH to OFF.

Return to Section TOC
Return to Master TOC

Return to Section TOC
Return to Master TOC

NOTES

TABLE OF CONTENTS
- ACCESSORIES SECTION -

ACCESSORIES SECTION ..... Section C
Replacement Magnum 250L Gun and Cable Assembly C-1
K607-1 Spool Gun Adapter Kit.....C-1
Installing the K607-1 Spool Adapter Kit C-1
Spool Gun Module Board Installation C-2
Spool Gun Connection Box Installation C-3
Spool Gun Preparation.....C-4
Spool Gun Connection.....C-4
Making a Weld with the Spool Gun Adapter (K607-1) Installed.....C-5
Timer Kit (K585-1).....C-6
Timer Kit Installation (Optional K585-1).....C-6
Making Spot and Stitch Welds with Timer Kit Installed ...C-7
Adjustable Gas Regulator and Hose Kit (K586-1).....C-7
Drive Roll Kits C-7

Return to Master TOC
Return to Master TOC
Return to Master TOC
Return to Master TOC

Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC

OPTIONS/ACCESSORIES

REPLACEMENT MAGNUM 250L GUN AND CABLE ASSEMBLY

The following GMAW gun and cable assemblies are available for use with the WIRE-MATIC 250. Each is rated 200 amps 60% duty cycle or 250 amps 35% duty cycle. The gun and cable assemblies are equipped with the integrated connector, twist-lock trigger connector, and includes a liner, diffuser, and contact tips for the wire sizes specified:

LENGTH	PART NO.	WIRE SIZE
10' (3.0 m) 12' (3.6 m) 15' (4.5 m)	K533-1 K533-2* K533-3	.035-.045" (0.9-1.2mm)
10' (3.0 m) 12' (3.6 m) 15' (4.5 m)	K533-4 K533-5 K533-6	.025-.030" (0.6-0.8mm)

* Included with the K578-1.

K607-1 SPOOL GUN ADAPTER KIT

The K607-1 Spool Gun Adapter Kit provides "up front" direct connection of the K487 Spool Gun (with remote speed control) or the K469 Spool Gun (requiring K518 Connection Adapter) for use with the WIRE-MATIC 250.

It also provides single switch transfer between the machine's feeder gun or the spool gun for same polarity welding with different wire and gas processes.

The kit includes a spool gun module board and a connection box assembly with connecting plug and lead harnesses, mounting hardware, installation instructions, and operating instructions.

INSTALLING THE K607-1 SPOOL GUN ADAPTER KIT

The spool gun module mounts inside the control section of the machine. It provides control and inter-connection between the machine's control board and the spool gun kit connection box.

The connection box mounts to the front of the machine's base. It provides for inlet connection of the spool gun gas supply hose, as well as up-front easy connection of the spool gun gas line, control plug, and electrode lead (using the Twist-Mate plug provided with the kit). An Installation and Operation Manual is included with the kit.

SPOOL GUN MODULE BOARD INSTALLATION

NOTE: The K607-1 Spool Gun Adapter Kit is designed for use with WIRE-MATIC 250 model codes above 9900. Model Codes below 9900 may be used with addition of holes to the case as described in the installation instructions below.

⚠ WARNING

Do not operate with covers removed. Disconnect AC input power before servicing. Do not touch electrically live parts. Only qualified electricians should install, use. or service this equipment.

1. Disconnect AC input power to the machine before installing the Spool Gun Module Board.
2. Remove the six screws from the Left Case Side and Door and Hinge Assembly.
3. Lift the Left Case Side and Door and Hinge Assembly up and over the lip of the center divider panel while pulling the case side away from the unit. Slide it out of the slots in the base.
4. Locate the four snap-mount fasteners mounted to the side panel of the P.C. board compartment. See Figure C.1.

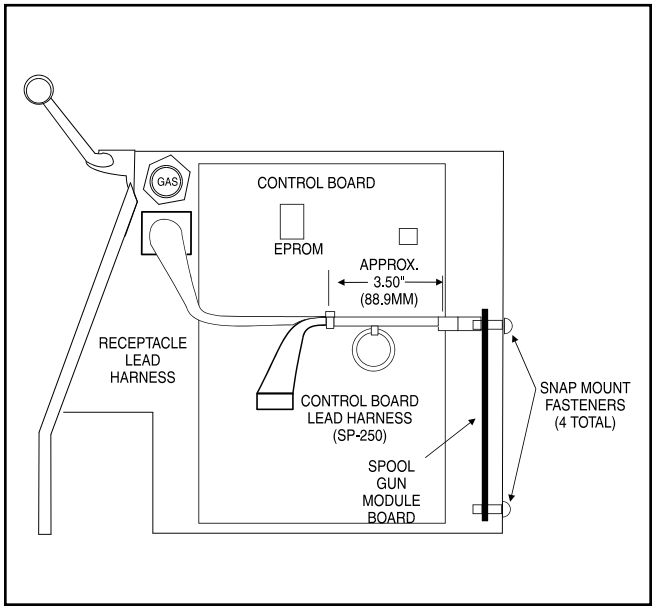


FIGURE C.1 - Spool Gun Module Board Installation.

5. Position the Spool Gun Module Board over the snap-mount fasteners with the lead plug connectors at the top.
6. Gently press the board onto the fasteners, making sure all the fasteners snap into place.
7. Remove the hex-head screw from beneath the gas connector on the wire drive side of the machine to release the small metal cover. See Figure C.2.

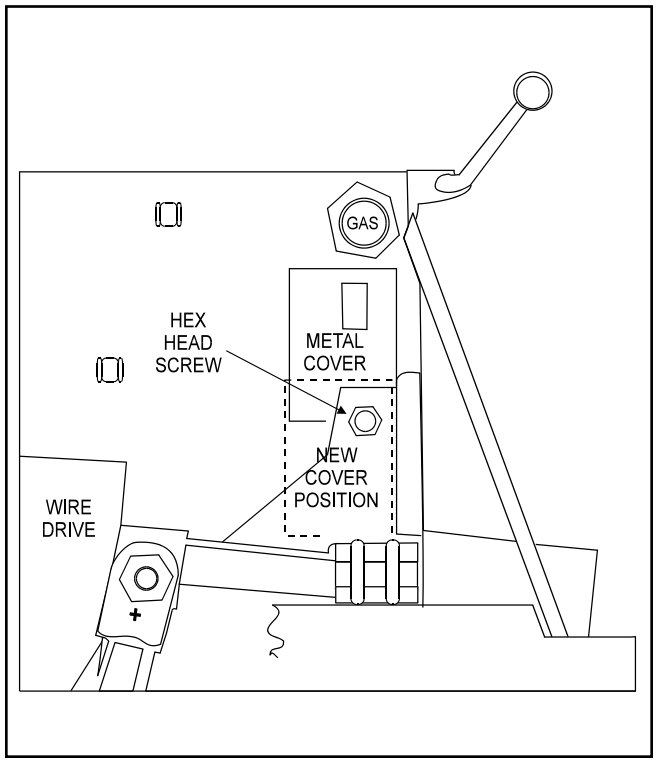


FIGURE C.2 - Spool Gun Installation.

8. Slide the metal cover out from behind the motor bracket.
9. Turn the cover over so the screw hole is in the top right corner, then reinstall as a spacer plate with the hex-head screw. See Figure C.2.
10. Locate the panel receptacle lead harness included in the kit. See Figure C.1.
11. Insert the panel receptacle into the hole on the control board side of the panel, making sure the panel receptacle mounting plate is positioned so the grounding screw is in the lower left corner of the plate. See Figure C.1.

NOTE: For model codes below 9900, small notches may need to be filed at top and bottom of panel hole to allow clearance of the plastic mounting ears.

Return to Section TOC
Return to Master TOC

Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC

⚠ CAUTION

Collect metal filings with a rag to protect against possible metal contamination of the control board or other internal electrical components.

12. Fasten the panel receptacle to the case with the three #6-32 x 3/8" self tapping screws provided.

    a. Insert the screws from wire drive side, through the sheet metal, and into the receptacle mounting plate holes.

13. Plug the 10-pin, 8-pin, and 6-pin connector plugs from the other end of the receptacle lead harness into the 10-pin, 8-pin, and 6-pin connectors (Molex plugs J12, J11, and J13) at the top of the Spool Gun Module Board.

    a. Plug the 8-pin connector at the opposite end of this harness into the unused 8-pin connector on the WIRE-MATIC 250 control board (Molex plug J4).

14. Disconnect the 4-pin gas solenoid plug from the receptacle (Molex plug J8) on the upper right corner of the Control Board as shown Figure C.1. Reconnect this plug to the 4-pin receptacle (Molex plug J14) on the top of the Spool Gun Module Board.

15. Plug the 4 pin connector plug, included with the panel receptacle harness connected in step 13 above, into the Control Board receptacle (J8), disconnected in step 14 above.

16. Using the cable tie included in the kit, tie the two harnesses together approximately 3.50 inches (88.9 mm) from the end of the lead plugs as shown in Figure C.1.

17. Replace the Case into the slots in the base. Make sure the lip of the case side is lifted over the top edge of the center panel during installation.

    a. Fasten Case Side with the six screws removed.

SPOOL GUN CONNECTION BOX INSTALLATION

NOTE: Model codes below 9900 require the addition of three holes to the front of the machine's base as shown in Figure C.3.

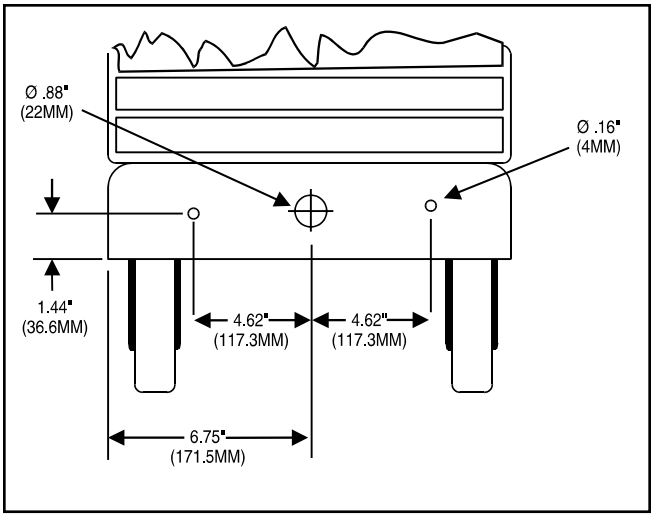


FIGURE C.3 - Spool Gun Connection Box Installation Mounting Holes.

1. Remove the plug button, if present, from the center hole in the front of the machine's base.

2. Insert the two #10 thread forming screws (provided with the kit) and partially thread them into the two small holes on both sides of the center hole.

3. Route a user provided gas supply hose from the flow regulator of the spool gun gas cylinder, over the rear axle of the machine, and out to the front through the center hole in the front of the base.

4. Connect the gas hose to the 5/8-18 female inert gas fitting on the back of the connection box.

5. Slip the connection box mounting keyholes over the screw heads installed in Step 2 above. Pivot the box clockwise to engage and level the box and then tighten the screws.

6. Route the control cable of the connection box up through the opening provided for the work lead in the front louver and then up behind the wire drive.

    a. Connect the plug to the kit receptacle when installing the Spool Gun Module Board. See Figure C.4.

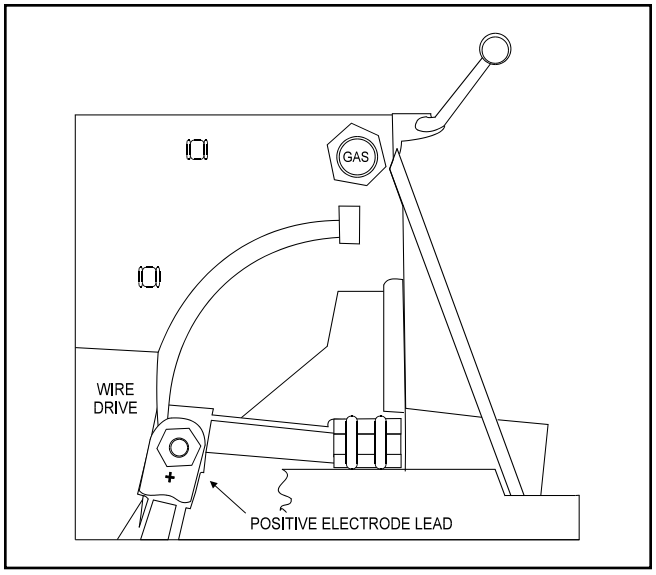


FIGURE C.4 - Spool Gun Connection Box Installation.

7. Route the electrode lead of the connection box up through the same opening in the front louver.

8. Remove the positive electrode lead from its connection on the wire drive with the machine connected for electrode positive (refer to Output Polarity Connection in ***Installation Chapter***).

9. Reconnect with the connection box electrode lead on the bolt under the positive electrode lead so the connection box electrode lead is sandwiched between the positive electrode lead terminal and the wire drive contact surface.

   a. Tighten snugly being careful not to strip the threads.

SPOOL GUN PREPARATION

1. Cut the terminal lug off the end of the spool gun electrode lead and slip the rubber boot, included in the kit, over the lead jacket. See Figure C.5.

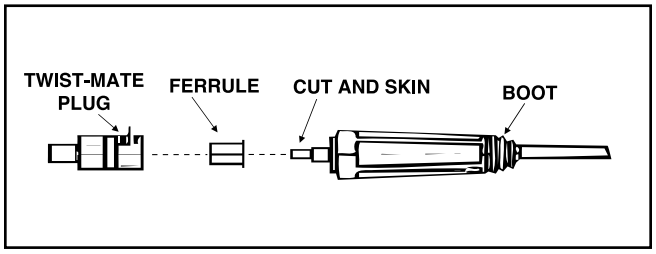


FIGURE C.5 - Spool Gun Preparation.

2. Strip .50" (12.7 mm) of insulation jacket off the lead end and slip the supplied copper tube ferrule over the stripped end.

3. Insert the lead end with ferrule completely into the brass Twist-Mate plug and tighten the set screw for a positive electrical connection.

4. Pull the rubber boot over the plug to insulate the connection.

SPOOL GUN CONNECTION

⚠ CAUTION

The spool gun module is intended for use with Lincoln Electric Magnum Spool Guns only. Use with other units may cause damage to the equipment. For Spool Gun operation, refer to the instruction manual provided with the Magnum Spool Gun.

1. Connect the spool gun control cable 6-pin plug to the mating receptacle on the front of the spool gun adapter connection box installed during Spool Gun Box Connection

NOTE: If using a K469 spool gun with 4 pin plug, use the K518 adapter.

2. Insert the Twist-Mate plug installed when preparing the spool gun into the mating receptacle on the front of the connection box and twist to lock the connection.

3. Attach the spool gun gas line to the gas outlet fitting on the front of the connection box.

NOTE: Refer to the Instruction Manual included with the K487 or K469 Spool Gun for more details about Spool Gun set-up and operation.

Return to Section TOC
Return to Master TOC

Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC

MAKING A WELD WITH THE SPOOL GUN ADAPTER (K607-1) INSTALLED

The toggle switch on the front of the spool gun adapter box permits quick transfer when you want to switch between using the WIRE-MATIC 250 Feeder Gun and the connected Spool Gun when the electrodes are at the same polarity.

⚠ CAUTION

In either transfer switch position, closing the gun trigger will cause the electrode of both guns to be electrically energized, or "HOT." Be sure the unused gun is positioned so the electrode or the tip will not contact metal case or other metal common to the work.

When the transfer switch is in the Feeder Gun position:

a. The Spool Gun trigger, wire feed, and gas output are disabled.

b. Closing the Feeder Gun trigger Starts Feeder Gun welding and makes the Feeder Gun and the Spool Gun electrodes electrically "HOT."

When the transfer switch is in the Spool Gun position:

a. The Feeder Gun, wire feed, and gas output are disabled.

b. Closing the Spool Gun trigger makes both the Feeder Gun and Spool Gun electrodes electrically "HOT" and activates Spool Gun gas output.

MAKING THE WELD:

1. Set the transfer switch in the SPOOL GUN position.

2. Turn input power ON by setting the POWER SWITCH in the ON position.

3. Adjust the VOLTAGE CONTROL KNOB to increase or decrease your welding Voltage.

4. Adjusting the Wire Speed Control will increase or decrease the Spool Gun Wire Feed Speed. This represents the set speed for the K469 Spool Gun and the maximum set speed for the K487 Spool Gun with the remote control in gun handle at maximum.

   The remote control turned to minimum will give approximately 50% of the maximum set WFS.

NOTE: The WIRE-MATIC 250 speed calibrated dial markings are not accurate when used for setting the Spool Gun speed.

The following procedure settings can be used as initial settings for making test welds to determine final settings:

Wire Diameter	Wire Feed Speed Setting	Arc Voltage Setting
.030” (.8mm)	270	15 V
.035” (.9mm)	250	16 V
3/64” (1.2mm)	210	21 V

5. To return to normal WIRE-MATIC 250 welding, set the transfer switch to FEEDER GUN position and reset feeder gun weld procedure settings.

Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC

TIMER KIT (K585-1)

The Timer Kit provides selectable 4-step trigger interlock, spot and stitch functions, and manual adjustment of burnback time. This kit installs easily using only a screwdriver. It replaces the blank upper panel on Case Front. It offers the following mode selections:

- The Normal Welding mode provides welding power only while gun trigger is pressed.
- The 4-Step Trigger mode eliminates the need to hold gun trigger while welding. It operates in 4 steps:
    1. Close trigger and establish welding arc.
    2. Release trigger and continue welding.
    3. Re-close trigger near end of weld.
    4. Release trigger again to stop welding.
- The Spot Weld mode allows a single timed weld cycle each time the gun trigger is held closed. Duration is set with SPOT/STITCH ON TIME knob.
- The Stitch Weld mode allows repeated timed weld cycles while gun trigger is held closed. Weld on-time is set with SPOT/STITCH ON TIME knob, and weld off time is set with STITCH OFF TIME knob.

The BURNBACK TIME knob is used to manually set arc power delay at the end of any above selected weld mode to prevent wire sticking in the weld. With the Timer Kit not installed, a preselected delay is automatically set by the machine.

TIMER KIT INSTALLATION (OPTIONAL K585-1)

⚠ WARNING

Remove all input power to the WIRE-MATIC 250 before proceeding.

1. Verify that the following items have been included in the kit:
    a. Timer Board and Panel Assembly.
    b. Two sheet metal screws.
    c. Wiring harness.
2. Turn the POWER SWITCH to OFF.
3. Disconnect AC input power to the machine.
4. Remove the Cover Plate Assembly from the front of the machine by removing the two screws which fasten it using a screwdriver, a 5/16" (8mm) nut driver, or other suitable tool.
5. Reach through the exposed panel opening and attach the rectangular 8-pin plug connector on the Timer Kit wiring harness to the available mating receptacle connector on the upper left corner of the Control Board inside the machine.
    a. Be sure that the latch on the connector is aligned with that on the Control Board and insert it until the latch engages.
    b. Check that the remaining connector on the opposite end of the wiring harness is firmly attached to the mating connector on the PC Board on the Timer Kit panel, and that the latch is engaged.
6. Align the Timer Kit panel so you can carefully insert the printed circuit board and wiring harness through the opening in the front panel.
    a. Make sure the wiring harness is not pinched between panels or between printed circuit board and front panel.
7. Fasten the Timer Kit assembly with either the two supplied screws or with the original screws to complete the installation.

Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC

MAKING SPOT AND STITCH WELDS WITH TIMER KIT INSTALLED

TO MAKE SPOT PLUG WELDS:

The SPOT WELD MODE is used to make spot plug welds when continuous welds are not needed or to hold thin sheet metal together prior to stitch welding or continuous welding.

Plug welds are made by using a punch to make a 3/16" (5mm) diameter hole in the top sheet and arc welding through the hole into the back sheet.

1. Punch 3/16" (5mm) holes in the top sheet.
2. Set the SPOT/STITCH ON-TIME control to approximately 1.2 seconds.
3. Set the procedure for the metal thickness to be welded.
4. Install spot weld nozzle (if available) on gun and press it against the top sheet so the top and bottom sheets are tight together.
5. Close trigger and hold it closed until the arc goes out.
    a. If a spot weld nozzle is not used, smoother welds will result by moving the welding wire in a small circle during the weld.

TO MAKE A STITCH WELD:

The STITCH WELD MODE is used to weld thin material when warpage and burn through are a problem. Proper adjustment of the Spot/Stitch On-Time, Stitch Off-Time, and arc travel speed permits welding thin sheet metal with small welds, minimum distortion, and no burnthrough.

1. The SPOT/STITCH ON-TIME KNOB sets welding time.
    a. Start with a dial setting of 0.5 seconds. Raise setting to increase penetration and weld size. Lower setting to reduce burnthrough and distortion.
2. The STITCH OFF-TIME KNOB sets off time between welds.
    a. Start with a dial setting of 0.5 seconds. Raise setting to reduce burnthrough. Lower setting to make weld flatter and smoother.
3. Set the procedure for the metal thickness to be welded.
4. Close trigger and hold it closed for length of seam.
    a. Hold gun in one place during ON time and move gun just beyond edge of molten metal during OFF time.

NOTE: For smoothest welds on thinner metal, point gun slightly toward the direction of travel.

ADJUSTABLE GAS REGULATOR AND HOSE KIT (K586-1)

The kit can be used with CO_2 or Argon blend gas. It includes a cylinder pressure gauge, a dual scale flow gauge, and a gas hose to connect the regulator to the WIRE-MATIC 250 gas inlet.

DRIVE ROLL KITS

The following drive rolls and Magnum 250L gun and cable parts are available to feed different sizes and types of electrodes.

Steel Wire Sizes:	**Part Number**
.025 - .035" (0.6-0.9mm)	M14932
.030 - .045" (0.8-1.2mm)	M15809
.045" Cored (1.2mm)	S14541-052 (2 Req'd)
Aluminum Wire Sizes:	
3/64" (1.2mm)	S17092-3/64A

TABLE OF CONTENTS
- MAINTENANCE SECTION -

MAINTENANCE SECTION ..... Section D
Safety Precautions D-1
Routine and Periodic Maintenance D-1
Component Locations D-2
Drive Rolls and Guide Tubes D-3
Drop-In Reel Spindle and Clips D-3
Cable Cleaning.....D-3
Gun Tubes and Nozzles.....D-3
Contact Tip and Gas Nozzle Installation.....D-3
Liner Removal and Replacement.....D-4
Liner Removal, Installation, and Trimming Instructions for Magnum 250L D-4
Gun Handle Disassembly D-5
Accessories and Expendable Replacement Parts for Magnum 250L Gun and Cable Assemblies D-6

Return to Master TOC
Return to Master TOC
Return to Master TOC
Return to Master TOC

Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC

SAFETY PRECAUTIONS

⚠ WARNING

- **Have a qualified electrician do the maintenance and troubleshooting work.**
- **Disconnect the input power off using the disconnect switch at the main input supply before working inside machine.**
- **Unplug the power cable if it is connected to a receptacle.**

Read the Safety Precautions in the front of this manual before working on this machine.

ROUTINE AND PERIODIC MAINTENANCE

1. Disconnect input AC power supply lines to the machine before performing periodic maintenance, tightening, cleaning, or replacing parts. See Figure D.1.

Perform the following daily:

1. Check that no combustible materials are in the welding or cutting area or around the machine.
2. Remove any debris, dust, dirt, or materials that could block the air flow to the machine.
3. Inspect the electrode cables for any slits, punctures in the cable jacket, or any condition that would affect the proper operation of the machine.

Perform Periodically:

Clean the inside of the machine with low pressure air stream. Clean the following parts. Refer to Figure D.1.

Main transformer and choke.
Electrode and work cable connections.
SCR rectifier bridge and heat sink fins.
Fan Motor Assembly.
Control Printed Circuit Board.

NOTE: The fan motor has sealed bearings which require no maintenance.

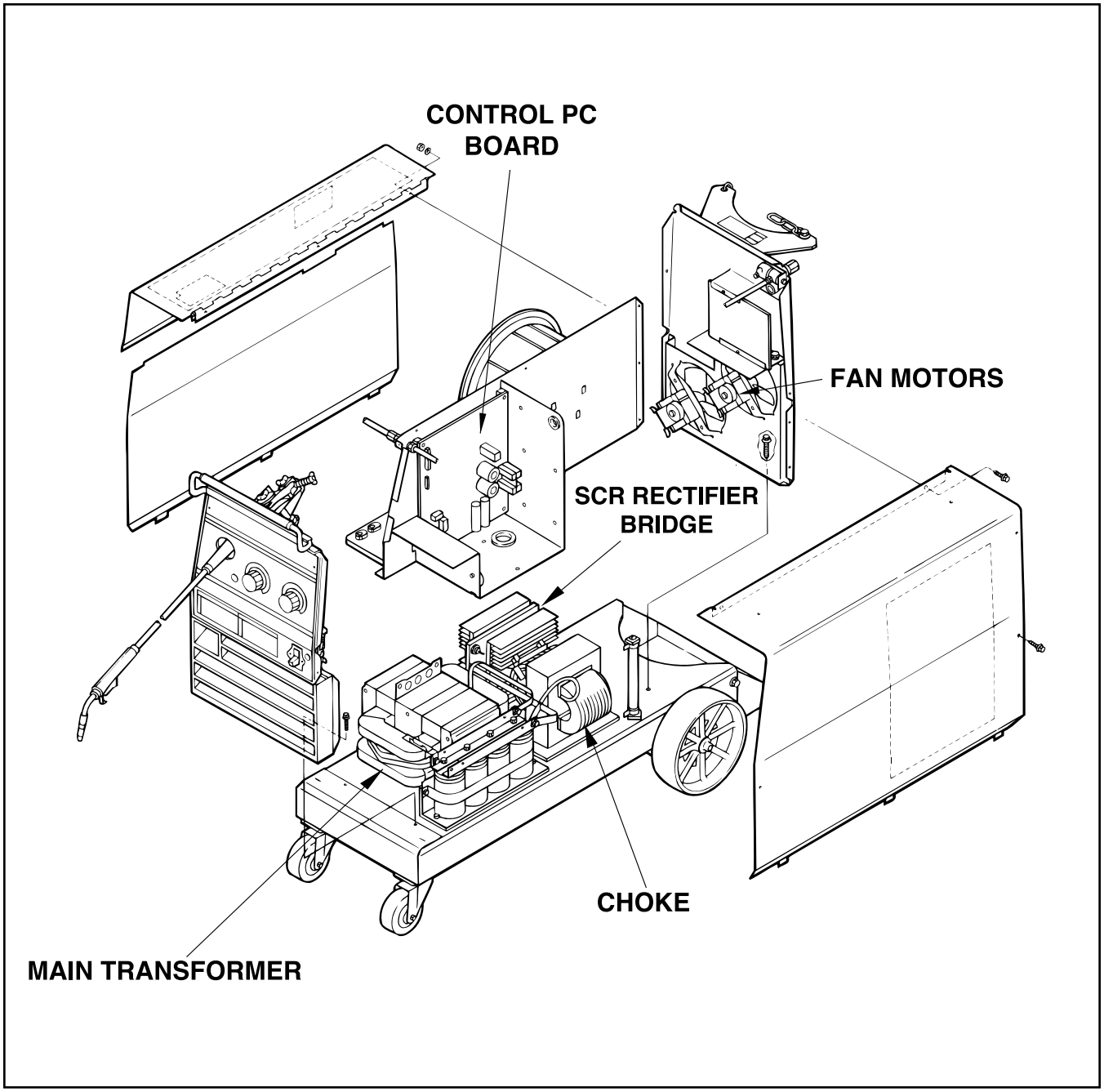


Figure D.1 - Component Locations.

Return to Section TOC
Return to Master TOC

Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC

DRIVE ROLLS AND GUIDE TUBES

After every coil of wire, inspect the wire drive mechanism. Clean it as necessary by blowing with low pressure compressed air. Do not use solvents for cleaning the idle roll because it may wash the lubricant out of the bearing. All drive rolls are stamped with the wire sizes they will feed. If a wire size other than that stamped on the roll is used, the drive roll must be changed.

DROP-IN REEL SPINDLE AND CLIPS

Before loading a coil of wire onto the WIRE-MATIC 250 drop-in spindle, inspect the mating surfaces of the spindle hubs and the spindle mounting clips (V-brackets) and, if necessary, wipe or blow out any dirt and debris which may have accumulated on these surfaces.

CABLE CLEANING

Clean the cable liner after using approximately 300 pounds (136 kg) of electrode.

1. Remove the cable from the wire feeder and lay it out straight on the floor.
2. Remove the contact tip from the gun.
3. With an air hose at the gas diffuser end, use low pressure to gently blow out the cable liner.

⚠ CAUTION

Excessive pressure at the start may cause the dirt to form a plug.

4. Flex the cable over its entire length and again blow out the cable.
5. Repeat this procedure until no more dirt comes out.

GUN TUBES AND NOZZLES

1. Replace worn contact tips as required.
2. Remove spatter from the inside of the gas nozzle and tip every 10 minutes of arc time or as required.

CONTACT TIP AND GAS NOZZLE INSTALLATION

1. Choose the correct size contact tip for the electrode being used (wire size is stenciled on the side of the contact tip) and screw it snugly into the gas diffuser.
   a. Be sure the nozzle insulator is fully screwed onto the gun tube and does not block the gas holes in the diffuser.
2. Slip or screw the appropriate gas nozzle onto the nozzle insulator.

Note: Either a standard .50" (12.7mm) or optional .62" (15.9mm) I.D. slip-on gas nozzle may be used and should be selected based on the welding application.

3. Adjust the gas nozzle as appropriate for the GMAW process to be used.
   a. Typically, the contact tip end should be flush to extended .12" (3.2mm) for the short-circuiting transfer process and recessed .12" (3.2mm) for spray transfer.

Return to Section TOC
Return to Master TOC

LINER REMOVAL AND REPLACEMENT

NOTE: When you change wire size, a replacement gas diffuser is required. Use the table below to select the proper diffuser so the liner is held securely in place.

Electrode Diameter	Replacement Liner Part Number	Size Stenciled on the End of the Liner Bushing	Gas Diffuser Part Number (and Stencil)
.025-.030" Steel (0.6-0.8mm)	M16087-2	.030 (0.8mm)	S19418-2
.035-.045" Steel (0.9-1.2mm)	M16087-1	.045 (1.2mm)	S19418-1
3/64" Aluminum (1.2mm)	M16107-1	(Plastic Liner)	S19418-1

LINER REMOVAL, INSTALLATION, AND TRIMMING INSTRUCTIONS FOR MAGNUM 250L

NOTE: The variation in cable lengths prevents the interchange ability of liners between guns. Once a liner has been cut for a particular gun, it should not be installed in another gun unless it can meet the liner cut off length requirement. Liners are shipped with the jacket of the liner extended the proper amount.

1. Remove the gas nozzle and nozzle insulator.
2. Locate the set screw in the gas diffuser which is used to hold the old liner in place.
3. Loosen the set screw with a 5/64" (2.0mm) Allen wrench.
4. Remove the gas diffuser from the gun tube.
5. Lay the gun and cable out straight on a flat surface.
6. Loosen the set screw located in the brass connector at the feeder end of the cable and pull the liner out of the cable.
7. Insert a new untrimmed liner into the connector end of the cable.
   a. Check the liner bushing stencil to make sure it is the appropriate one for the wire size being used.
8. Fully seat the liner bushing into the connector.
9. Tighten the setscrew on the brass cable connector.

NOTE: Do not install the gas diffuser onto the end of the gun tube at this time.

10. Straighten the cable with the gas nozzle and nozzle insulator removed from the gun tube.
11. Trim the liner to the length shown in FIGURE D.2.

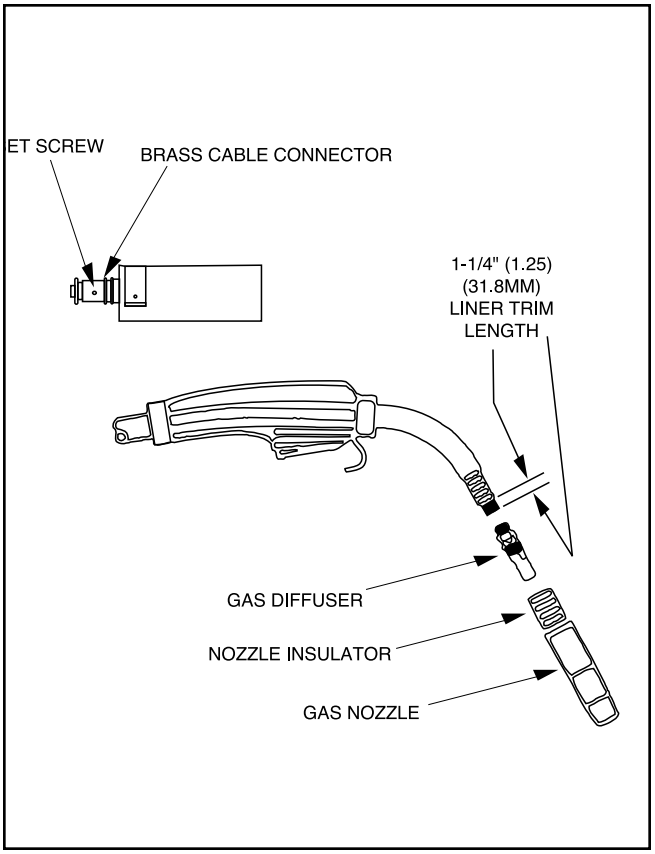


FIGURE D.2 - Liner maintenance.

12 Remove any burrs from the end of the liner.

13. Screw the gas diffuser onto the end of the gun tube and tighten.

NOTE: Be sure the gas diffuser is correct for the liner being used. (See table and diffuser stencil.)

14. Slightly tighten the set screw in the side of the gas diffuser against the cable liner using 5/64" (2.0mm) Allen wrench.

⚠ CAUTION

This screw should only be gently tightened. Over tightening will split or collapse the liner and cause poor wire feeding.

GUN HANDLE DISASSEMBLY

The internal parts of the gun handle may be inspected or serviced if necessary.

The gun handle consists of two halves that are held together with a collar on each end.

To open up the handle:

1. Turn the collars approximately 60 degrees counterclockwise (the same direction as removing a right hand thread) until the collar reaches a stop.

2. Pull the collar off the gun handle.

NOTE: If the collars are difficult to turn, position the gun handle against a corner, place a screwdriver against the tab on the collar and give the screwdriver a sharp blow to turn the collar past an internal locking rib. See Figure D.3.

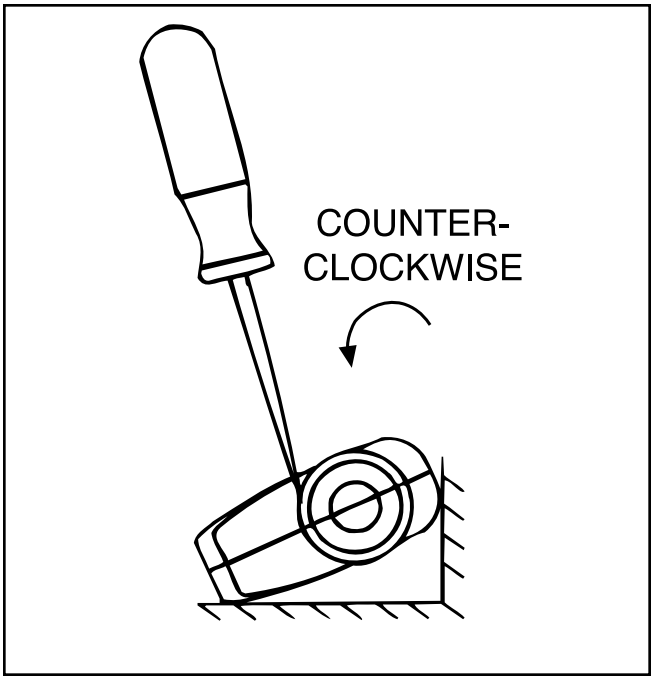


FIGURE D.3 - Gun Handle disassembly.

Return to Section TOC
Return to Master TOC

Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC

ACCESSORIES AND EXPENDABLE REPLACEMENT PARTS FOR MAGNUM 250L GUN AND CABLE ASSEMBLIES

DESCRIPTION	PART NO.	ENGLISH SIZE	METRIC SIZE
Cable Liner For 15' (4.5m) or Shorter Cable	M16087-2 M16087-1* M17701-1**	.025- .030" .035- .045" 3/64" (Alum. Wire)	0.6 - 0.8 mm 0.9 - 1.2 mm 1.2 mm (Alum. Wire)
Contact Tips Standard Duty	S19391-6 S19391-7 S19391-1* S19391-2*	.025" .030" .035" .045"	0.6 mm 0.8 mm 0.9 mm 1.2 mm
Heavy Duty	S19392-1 S19292-2	.035" .045"	0.9 mm 1.2 mm
Tapered	S19393-5 S19393-6 S19393-1 S19393-2	.025" .030" .035" .045"	0.6 mm 0.8 mm 0.9 mm 1.2 mm
Gas Diffuser Assembly	S19418-2 S19418-1	0.25 - .030" 0.35 - .045"	0.6 - 0.8 mm 0.9 - 1.2 mm
Gas Nozzles Adjustable Slip-On (Requires Nozzle Insulator Assembly.)	 M16093-2* M16093-1	 1/2" 5/8"	 12.7 mm 15.9 mm
Nozzle Insulator Assembly	S19417-1*		
Gasless Nozzle (for Innershield®)	M16938		
Gun Tube Assembly Standard (60 Degrees) 45 Degrees	 S18920* S19890**		

* Included with WIRE-MATIC 250

** 5356 alloy aluminum wire and 45° gun tube are recommended to alleviate potential soft wire feeding problems with push-type wire feeding.

Return to Section TOC
Return to Master TOC

NOTES

TABLE OF CONTENTS
- THEORY OF OPERATION SECTION -

THEORY OF OPERATION SECTION ..... Section E
Power Supply Operation E-1
Input Line Voltage and Main Transformer E-1
Output Rectification and Feedback Control E-2
Constant Voltage Output E-3
Wire Drive Motor and Feedback E-4
Thermal Protection E-5
SCR Operation E-6

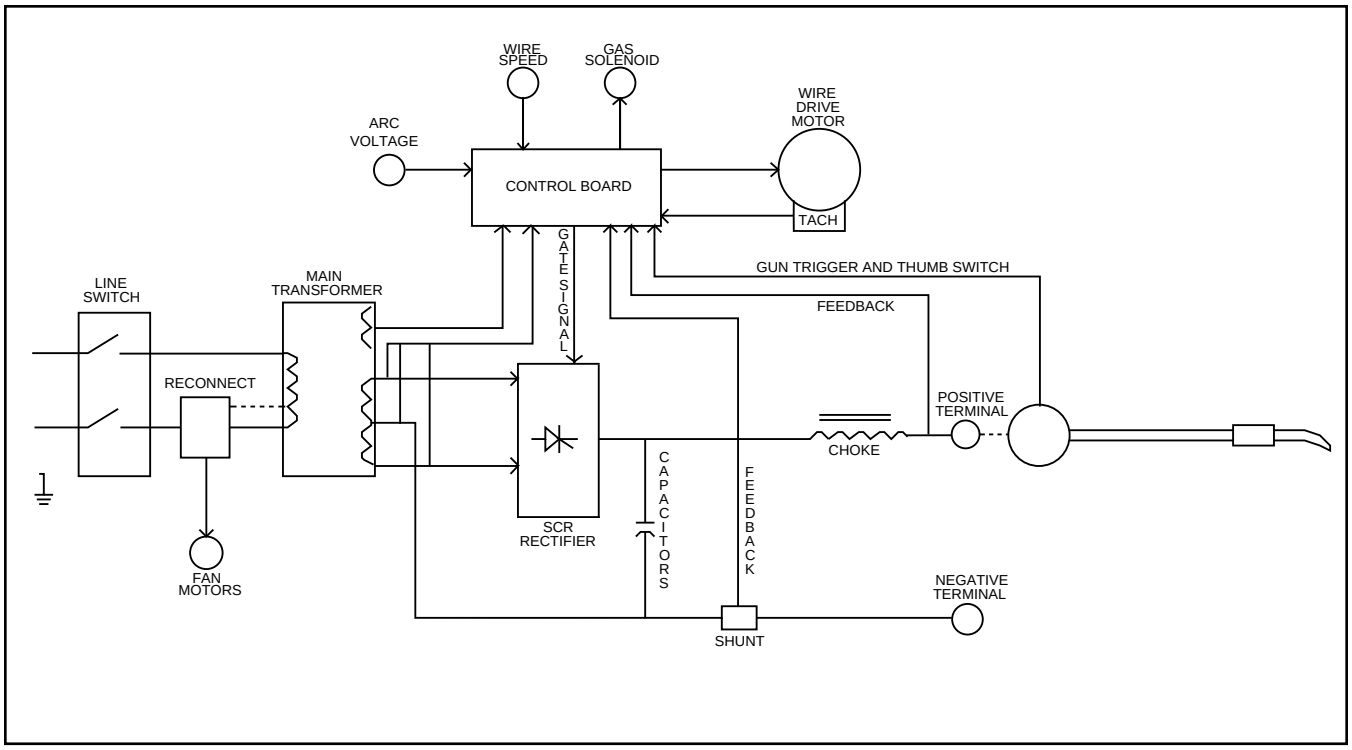


Figure E.1 -Block Logic Diagram

NOTE: Unshaded areas of Block Logic Diagram are the subject of discussion

Return to Master TOC
Return to Master TOC
Return to Master TOC
Return to Master TOC

INPUT LINE VOLTAGE AND MAIN TRANSFORMER

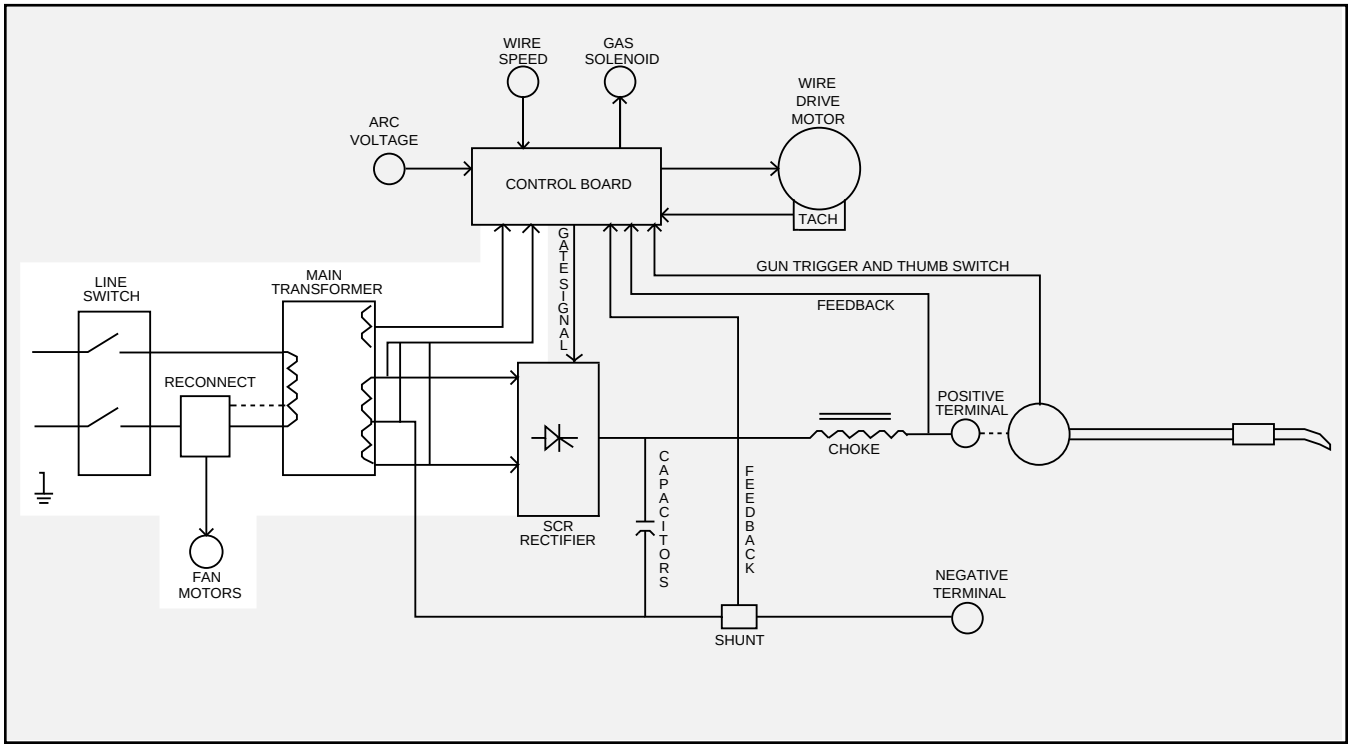


Figure E.2 - Input Line Voltage and Main Transformer.

INPUT LINE VOLTAGE AND MAIN TRANSFORMER

The desired single phase input power is connected to the WIRE-MATIC 250 through a line switch located on the front panel.

A reconnect panel allows the user to configure the machine for the desired input voltage. This AC input voltage is applied to the primary of the main transformer and to the thermostatically controlled fan motors. The transformer changes the high voltage, low current input power to a low voltage, high current output. In addition, the main transformer also has an isolated center tapped 30 VAC auxiliary winding that supplies power to the Control Board for SCR gate drive and gas solenoid operation. The weld power windings connect to the Control Board as well as to the main SCR Rectifier.

NOTE: Unshaded areas of Block Logic Diagram are the subject of discussion

Return to Section TOC
Return to Master TOC

OUTPUT RECTIFICATION AND FEEDBACK

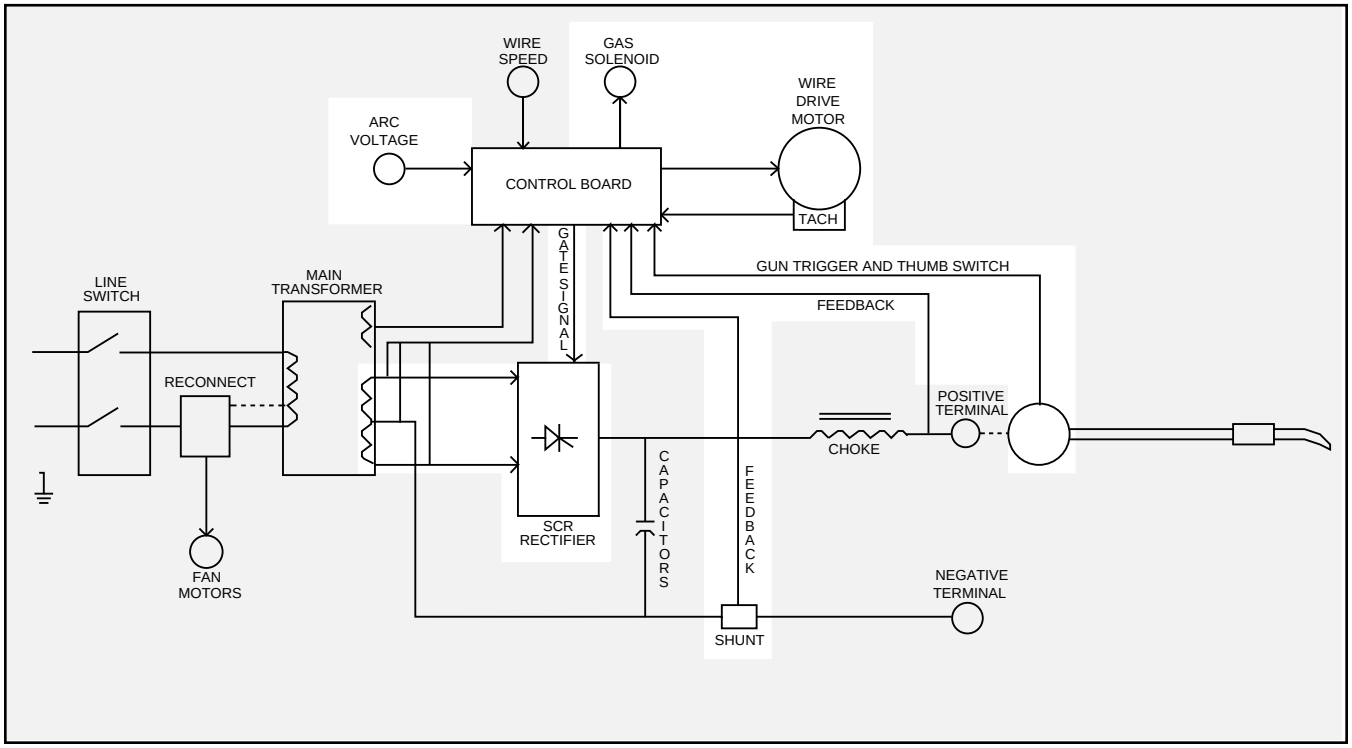


Figure E.3 - Output Rectification and Feedback.

OUTPUT RECTIFICATION AND FEEDBACK CONTROL

The AC output from the main transformer secondary weld winding is rectified and controlled through the SCR rectifier assembly. Output voltage and current are sensed at the shunt and output terminals and are fed back to the control board. The control board compares the commands of the ARC Voltage Control potentiometer with the feedback signals. The appropriate gate firing pulses are generated by the control board and applied to the SCR rectifier assembly. The control board controls the firing of the SCRs, thus controlling the output of the machine. See ***SCR Operation***. The control board also powers and commands the gas solenoid and the wire drive motor.

NOTE: Unshaded areas of Block Logic Diagram are the subject of discussion

Return to Section TOC
Return to Master TOC

CONSTANT VOLTAGE OUTPUT

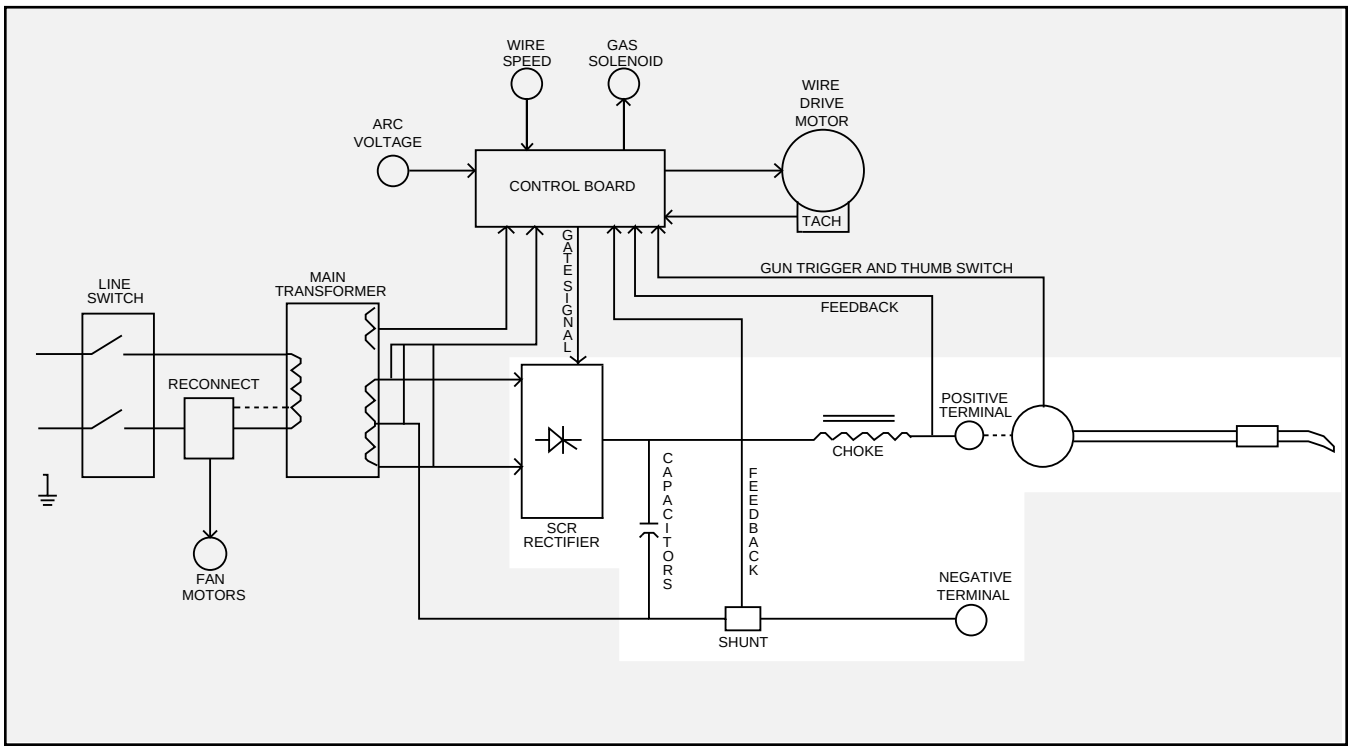


Figure E.4 - Constant Voltage Output.

CONSTANT VOLTAGE OUTPUT

The controlled DC output from the SCR rectifier assembly is filtered by the capacitor bank resulting is a constant voltage DC output. Since the output choke is in series with the positive leg of the rectifier and also in series with the gun and welding load, a filtered constant voltage output is applied to the output terminals of the machine.

NOTE: Unshaded areas of Block Logic Diagram are the subject of discussion

Return to Section TOC
Return to Master TOC

WIRE DRIVE MOTOR AND FEEDBACK

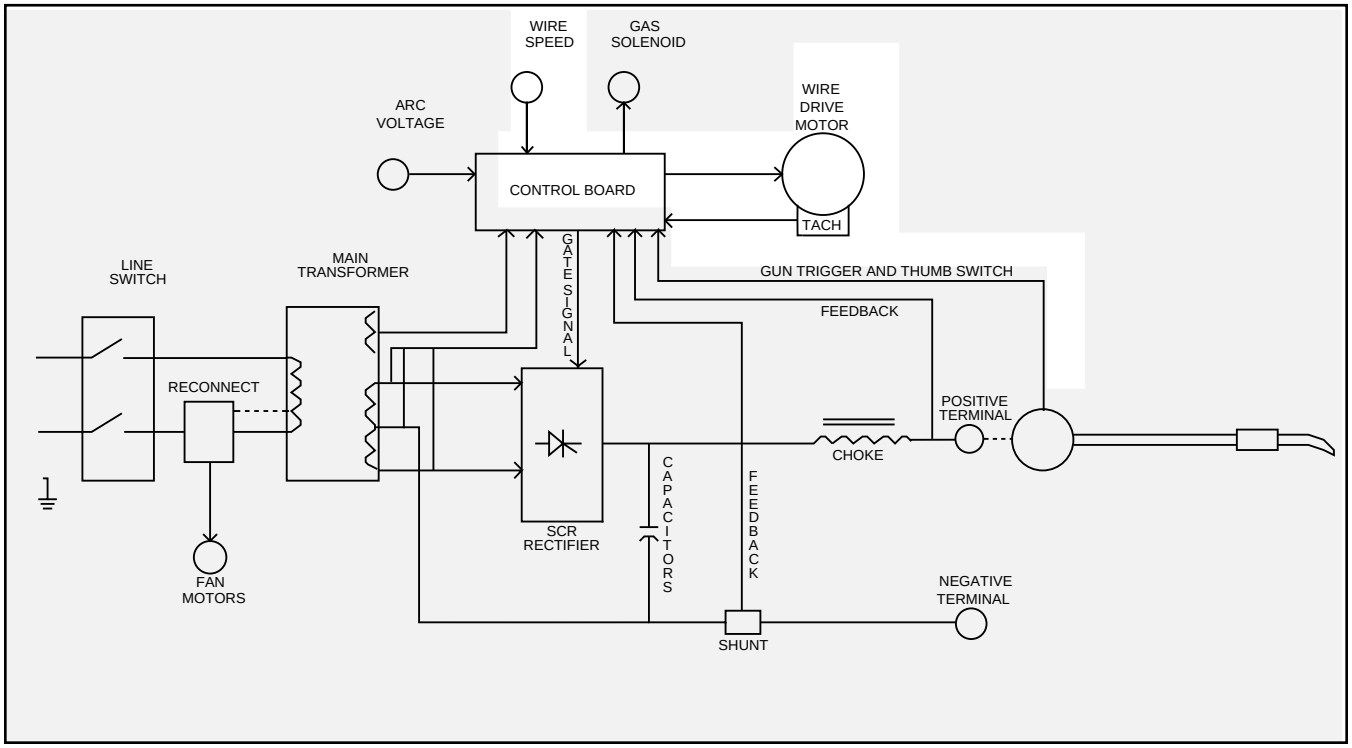


Figure E.5 - Wire Drive Motor and Feedback.

WIRE DRIVE MOTOR AND FEEDBACK

The wire drive motor is controlled by the control board. A motor speed feedback signal is generated at the motor tach and sent to the control board. The control board compares this feedback signal with the commands set forth by the Wire Speed Control potentiometer and sends the appropriate armature voltage to the wire drive motor. The drive motor speed is thus controlled which in turn regulates the electrode wire feed speed through the gun.

NOTE: Unshaded areas of Block Logic Diagram are the subject of discussion

Return to Section TOC
Return to Master TOC

Return to Section TOC
Return to Master TOC

THERMAL PROTECTION

A thermostat protects the machine from excessive operating temperatures. Excessive operating temperatures may be caused by a lack of cooling air or operating the machine beyond the duty cycle and output rating. There are three thermostats within the WIRE-MATIC 250 machine. One of the thermostats, located on the output choke, energizes the cooling fan motors when required. The other choke thermostat "opens" the trigger circuit, preventing machine weld output and wire feed, if excessive operating temperatures are detected. The third thermostat insures that the fan motors are operating when required.

The thermostats are self-resetting once the machine cools sufficiently. If the thermostat shutdown is caused by excessive output or duty cycle and the fans are operating normally, the power switch may be left on and the reset should occur within a 15 minute period. If the fans are not turning or the air intake louvers are obstructed, then the input power must be removed and the fan problem or air obstruction be corrected.

NOTE: Unshaded areas of Block Logic Diagram are the subject of discussion

SCR OPERATION

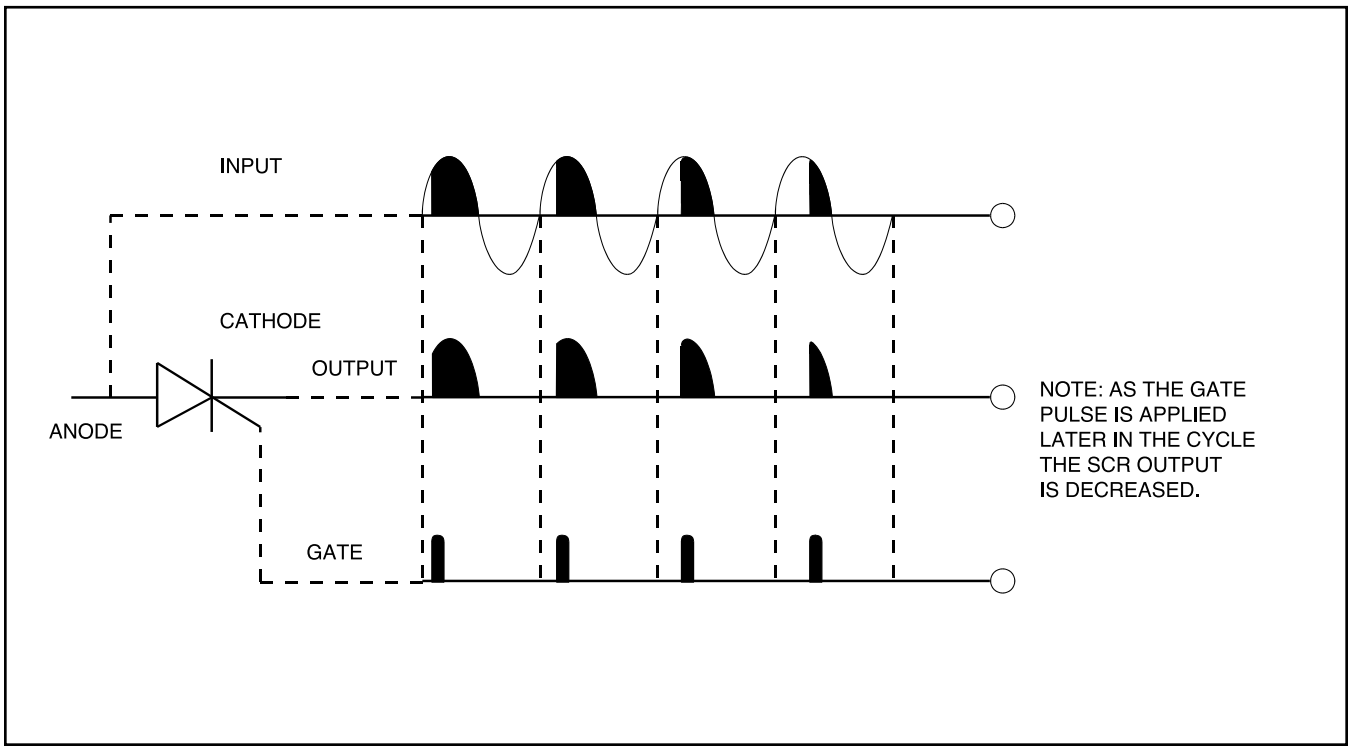


Figure E.6 - SCR Operation

A silicon controlled rectifier (SCR) is a three terminal device used to control rather large currents to a load. An SCR acts very much like a switch. When a gate signal is applied to the SCR it is turned ON and there is current flow from anode to cathode. In the ON state the SCR acts like a closed switch. When the SCR is turned OFF there is no current flow from anode to cathode thus the device acts like an open switch. As the name suggests, the SCR is a rectifier, so it passes current only during positive half cycles of the AC supply. The positive half cycle is the portion of the sine wave in which the anode of the SCR is more positive than the cathode.

When an AC supply voltage is applied to the SCR, the device spends a certain portion of the AC cycle time in the off state and the remainder of the time in the on state. The amount of time spent in the ON state is controlled by the gate.

An SCR is fired by a short burst of current into the gate. This gate pulse must be more positive than the cathode voltage. Since there is a standard PN junction between gate and cathode, the voltage between these terminals must be slightly greater than 0.6V. Once the SCR has fired it is not necessary to continue the flow of gate current. As long as current continues to flow from anode to cathode the SCR will remain on. When the anode to cathode current drops below a minimum value, called holding current, the SCR will shut off. This normally occurs as the AC supply voltage passes through zero into the negative portion of the sine wave. If the SCR is turned on early in the positive half cycle, the conduction time is longer resulting in greater SCR output. If the gate firing occurs later in the cycle the conduction time is less resulting in lower SCR output.

Return to Section TOC
Return to Master TOC

Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC

NOTES

TABLE OF CONTENTS
- TROUBLESHOOTING & REPAIR SECTION -

TROUBLESHOOTING & REPAIR SECTION ..... Section F
How to use Troubleshooting Guide F-1
PC Board Troubleshooting Procedures F-2
Troubleshooting Guide F-3
Test Procedures
- Main Transformer Test F-10
- Static Output Rectifier Bridge Test F-13
- Active SCR Rectifier Assembly Test F-16
- Wire Drive Motor and Tachometer Feedback Test F-19

Oscilloscope Waveforms F-22
- Normal Open Circuit Voltage Waveform F-22
- Typical Output Voltage Waveform - Machine Loaded F-23
- Abnormal Output Voltage Waveform - Machine Loaded One Output SCR Not Functioning F-24
- Abnormal Open Circuit Voltage Output Capacitor Bank Not Functioning F-25
- Typical SCR Gate Voltage Waveform F-26

Replacement Procedures
- Control PC Board Removal and Replacement F-27
- Wire Drive Assembly Removal and Replacement F-29
- SCR Output Rectifier Removal and Replacement F-31
- Capacitor Bank Removal and Replacement F-33
- Main Transformer Removal and Replacement F-35
- Fan Motor and Fan Removal and Replacement F-37
- Retest After Repair F-40

Return to Master TOC
Return to Master TOC
Return to Master TOC
Return to Master TOC

Return to Section TOC
Return to Master TOC

HOW TO USE TROUBLESHOOTING GUIDE

⚠ WARNING

Service and Repair should only be performed by Lincoln Electric Factory Trained Personnel. Unauthorized repairs performed on this equipment may result in danger to the technician and machine operator and will invalidate your factory warranty. For your safety and to avoid Electrical Shock, please observe all safety notes and precautions detailed throughout this manual.

This Troubleshooting Guide is provided to help you locate and repair possible machine malfunctions. Simply follow the three-step procedure listed below.

Step 1. LOCATE PROBLEM (SYMPTOM).
Look under the column labeled "PROBLEM (SYMPTOMS)". This column describes possible symptoms that the machine may exhibit. Find the listing that best describes the symptom that the machine is exhibiting. Symptoms are grouped into the following categories: output problems, function problems, wire feeding problems, and welding problems.

Step 2. PERFORM EXTERNAL TESTS.
The second column labeled "POSSIBLE AREAS OF MISADJUSTMENT(S)" lists the obvious external possibilities that may contribute to the machine symptom. Perform these tests/checks in the order listed. In general, these tests can be conducted without removing the case wrap-around cover.

Step 3. RECOMMENDED COURSE OF ACTION

The last column labeled "Recommended Course of Action" lists the most likely components that may have failed in your machine. It also specifies the appropriate test procedure to verify that the subject component is either good or bad. If there are a number of possible components, check the components in the order listed to eliminate one possibility at a time until you locate the cause of your problem.

All of the referenced test procedures referred to in the Troubleshooting Guide are described in detail at the end of this chapter. Refer to the Troubleshooting and Repair Table of Contents to locate each specific Test Procedure. All of the specified test points, components, terminal strips, etc. can be found on the referenced electrical wiring diagrams and schematics. Refer to the Electrical Diagrams Section Table of Contents to locate the appropriate diagram.

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric Service Department for technical troubleshooting assistance before you proceed call 216-383-2531 or 1-800-833-9353.

Return to Section TOC
Return to Master TOC

PC BOARD TROUBLESHOOTING PROCEDURES

⚠ WARNING

ELECTRIC SHOCK can kill.

Have an electrician install and service this equipment. Turn the input power OFF at the fuse box before working on equipment. Do not touch electrically hot parts.

CAUTION: Sometimes machine failures appear to be due to PC board failures. These problems can sometimes be traced to poor electrical connections. To avoid problems when troubleshooting and replacing PC boards, please use the following procedure:

1. Determine to the best of your technical ability that the PC board is the most likely component causing the failure symptom.

2. Check for loose connections at the PC board to assure that the PC board is properly connected.

3. If the problem persists, replace the suspect PC board using standard practices to avoid static electrical damage and electrical shock. Read the warning inside the static resistant bag and perform the following procedures:

ATTENTION
Static-Sensitive Devices
Handle only at Static-Safe Workstations

Reusable Container
Do Not Destroy

P.C. Board can be damaged by static electricity.

- Remove your body's static charge before opening the static-shielding bag. Wear an anti-static wrist strap. For safety, use a 1 Meg ohm resistive cord connected to a grounded part of the equipment frame.

- If you don't have a wrist strap, touch an unpainted, grounded, part of the equipment frame. Keep touching the frame to prevent static build-up. Be sure not to touch any electrically live parts at the same time.

- Tools which come in contact with the P.C. Board must be either conductive, anti-static or static-dissipative.

- Remove the P.C. Board from the static-shielding bag and place it directly into the equipment. Don't set the P.C. Board on or near paper, plastic or cloth which could have a static charge. If the P.C. Board can't be installed immediately, put it back in the static-shielding bag.

- If the P.C. Board uses protective shorting jumpers, don't remove them until installation is complete.

- If you return a P.C. Board to The Lincoln Electric Company for credit, it must be in the static-shielding bag. This will prevent further damage and allow proper failure analysis.

4. Test the machine to determine if the failure symptom has been corrected by the replacement PC board.

NOTE: It is desirable to have a spare (known good) PC board available for PC board troubleshooting.

NOTE: Allow the machine to heat up so that all electrical components can reach their operating temperature.

5. Remove the replacement PC board and substitute it with the original PC board to recreate the original problem.

   a. If the original problem does not reappear by substituting the original board, then the PC board was not the problem. Continue to look for bad connections in the control wiring harness, junction blocks, and terminal strips.

   b. If the original problem is recreated by the substitution of the original board, then the PC board was the problem. Reinstall the replacement PC board and test the machine.

6. Always indicate that this procedure was followed when warranty reports are to be submitted.

NOTE: Following this procedure and writing on the warranty report, "INSTALLED AND SWITCHED PC BOARDS TO VERIFY PROBLEM," will help avoid denial of legitimate PC board warranty claims.

TROUBLESHOOTING GUIDE - Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENTS(S)	RECOMMENDED COURSE OF ACTION
OUTPUT PROBLEMS		
Major Physical or Electrical Damage is Evident	1. Contact your local Lincoln Electric Authorized Field Service Facility.	1. Contact The Lincoln Electric Service Dept. (216) 383-2531 or 1-800-833-9353 (WELD)
Machine is dead- No Open Circuit Voltage output and No Wire Feed when gun trigger is pulled.	1. Make certain that the input power switch is in the "ON" position. 2. Check the input voltage at the machine. Input voltage must match the rating plate and the reconnect panel. 3. Blown or missing fuses in the input line. 4. The thermostats may be open due to machine overheating. If machine operates normally after a cooling off period then check for proper fan operation and ventilation. Make certain that the machine's duty cycle is not being exceeded. 5. Check the trigger circuit. Leads #324 to #325 should have continuity (zero ohms) when the gun trigger is pulled. If not then the gun may be faulty - replace.	1. Check input power switch (S1). It may be faulty. 2. Check for lose or broken wires at the reconnect panel. 3. Perform ***Main Transformer Test***. 4. Check the thermostats and associated leads for loose or broken connections. See wiring diagram. 5. The control board may be faulty. Replace.

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric Service Department for technical troubleshooting assistance before you proceed call 216-383-2531 or 1-800-833-9353

Return to Section TOC Return to Master TOC Return to Section TOC Return to Master TOC Return to Section TOC Return to Master TOC Return to Section TOC Return to Master TOC

TROUBLESHOOTING GUIDE - Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENTS(S)	RECOMMENDED COURSE OF ACTION
OUTPUT PROBLEMS		
No Open Circuit Voltage output but wire feeds normally when gun trigger is pulled.	1. Check the input voltage at the machine. Input voltage must match the rating plate and the reconnect panel. 2. The gun may be faulty. Check or replace.	1. Check for loose or broken connections at the output terminals, the choke, the capacitor bank and all heavy current carrying leads. 2. Make sure that the transformer secondary leads are securely connected to the SCR Rectifier Assembly. 3. Perform the ***SCR Rectifier Assembly Test***. 4. The control board may be faulty - Replace.
Wire feeds but welding output is low causing wire to "stub". Welds are "cold". Machine cannot obtain full rated output of 200 amps at 28 volts.	1. Make sure that the proper wire and procedures are being used. 2. Check gun and work cable for loose or faulty connections.	1. Check for loose or faulty connections of the heavy current carrying leads. 2. The output capacitor bank may be faulty. Check for loose connections at the capacitors. Also check for leaky capacitors. Replace if necessary. **WARNING: The liquid electrolyte in these capacitors is toxic. Avoid contact with any portion of your body.** 3. Perform the ***SCR Rectifier Assembly Test***. 4. Perform the ***Main Transformer Test***. 5. The control board may be faulty. Replace.

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric Service Department for technical troubleshooting assistance before you proceed call 216-383-2531 or 1-800-833-9353

Return to Section TOC
Return to Master TOC

TROUBLESHOOTING GUIDE - Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENTS(S)	RECOMMENDED COURSE OF ACTION
OUTPUT PROBLEMS		
The output voltage and wire feed is present continuously or pulsing when gun trigger is NOT activated.	1. Remove the gun. If the problem is resolved the gun trigger circuit is faulty. Repair or replace. 2. If the problem is not resolved then contact your Local Lincoln Electric Authorized Field Service Facility.	1. Check the machine's internal trigger leads for grounds or shorts. See Wiring Diagram. 2. The control board may be faulty. Replace.

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric Service Department for technical troubleshooting assistance before you proceed call 216-383-2531 or 1-800-833-9353

Return to Section TOC Return to Master TOC

TROUBLESHOOTING GUIDE - Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENTS(S)	RECOMMENDED COURSE OF ACTION
FUNCTION PROBLEMS		
No control of arc voltage. Wire feeding is normal.	1. The Arc Voltage Control potentiometer may be dirty. Rotate several times and check if problem is resolved.	1. The Arc Voltage Control potentiometer may be faulty. Check or replace. See Wiring Diagram. 2. Perform the ***SCR Rectifier Assembly Test***. 3. The control board may be faulty. Replace.
There is no gas flow when gun trigger is pulled. Wire feeds and weld voltage is present.	1. Check gas source and hoses for leaks or kinks.	1. Check the gas solenoid by disconnecting it from the control board (Plug J8) and applying a 12 VDC external supply to the gas solenoid. If the solenoid does NOT activate then it may be faulty. Replace. 2. The control broad may be faulty. Replace.
The machine stops feeding wire while welding.	1. Check for mechanical restrictions in the wire feeding path. The gun may be clogged.	1. Check the motor armature current. Normal armature current is 1.75 amps maximum. If the motor armature current is normal the control board may be faulty. Replace. 2. If the motor armature current is high (2 to 2.5 amps) and there are NO restrictions in the wire feeding path then the motor or gear box may be defective. Replace.

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric Service Department for technical troubleshooting assistance before you proceed call 216-383-2531 or 1-800-833-9353

Return to Section TOC Return to Master TOC Return to Section TOC Return to Master TOC Return to Section TOC Return to Master TOC

TROUBLESHOOTING GUIDE - Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENTS(S)	RECOMMENDED COURSE OF ACTION
WIRE FEEDING PROBLEMS		
No control of wire feed speed. Other machine functions are normal.	1. The wire feed speed control may be dirty. Rotate several times and check if problem is resolved.	1. The Wire Speed Control potentiometer may be faulty. Check or replace. See Wiring Diagram. 2. Perform the ***Wire Drive Motor and Tach Feedback test***. 3. The control board may be faulty. Replace.
There is no wire feed when gun trigger is pulled. Normal open circuit voltage is present.	1. If the drive rolls are turning then check for a mechanical restriction in the wire feed path. 2. The gun liner may be clogged. Check or Replace. 3. If the drive rolls are NOT turning when the gun trigger is pulled then contact your local Lincoln Electric Authorized Field Service Facility.	1. Perform the ***Wire Drive Motor and Tach Feedback Test***. 2. The Wire Feed Control potentiometer may be faulty. Check or replace. See Wiring Diagram. 3. The control board may be faulty. Replace.

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric Service Department for technical troubleshooting assistance before you proceed call 216-383-2531 or 1-800-833-9353

Return to Section TOC
Return to Master TOC

TROUBLESHOOTING GUIDE - Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENTS(S)	RECOMMENDED COURSE OF ACTION
WELDING PROBLEMS		
The arc is unstable and or "hunting".	1. Check for worn or melted contact tip. 2. Check for loose or faulty connections on the work and electrode cables. 3. Make sure electrode polarity is correct or welding process being used. 4. Check for rusty or dirty wire. 5. Make sure machine settings and gas are correct for process being used.	1. Check for loose connections at the output terminals, the choke, the capacitor bank and all heavy current carrying leads. 2. Make sure that the transformer secondary leads are securely connected to the SCR Rectifier Assembly. 3. The output capacitor bank may be faulty. Check for loose connections at the capacitors. Also check for leaky capacitors. Replace if necessary. **WARNING: The liquid electrolyte in these capacitors is toxic. Avoid contact with any portion of your body.** 4. The control board may be faulty. Replace
Weld bead is narrow or ropy. May have porosity with electrode stubbing into plate.	1. Make sure the weld procedure and electrode polarity is correct for the process being used. 2. Make sure shielding gas is correct and flow is proper. 3. Make sure the weld joint is not "contaminated".	1. The output capacitor bank may be faulty. Check for loose connections at the capacitors. Also check for leaky capacitors. Replace if necessary. **WARNING: The liquid electrolyte in these capacitors is toxic. Avoid contact with any portion of your body.** 2. The control board may be faulty. Replace.
The contact tip seizes in the gas diffuser.	1. The tip being over heated due to excessive current and/or high duty cycle welding. 2. A light application of high temperature antisieze lubricant (such as Lincoln E2607 Graphite Grease) may be applied to the contact tip threads.	

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric Service Department for technical troubleshooting assistance before you proceed call 216-383-2531 or 1-800-833-9353

Return to Section TOC Return to Master TOC

TROUBLESHOOTING GUIDE - Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENTS(S)	RECOMMENDED COURSE OF ACTION
WELDING PROBLEMS		
The welding arc is variable and sluggish.	1. Check the welding cable connections for loose or faulty connections. 2. Make sure the wire feed speed, voltage, and shielding gas are correct for the process being used.	1. Perform the ***Output Rectifier Bridge Test.*** 2. The control board may be faulty. Replace.
The arc striking is poor.	1. Check the welding cable connections for loose or faulty connections. 2. Make sure the wire feed speed, voltage, and shielding gas are correct for the process being used.	1. The control board may be faulty. Replace.

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric Service Department for technical troubleshooting assistance before you proceed call 216-383-2531 or 1-800-833-9353

Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC

MAIN TRANSFORMER TEST

⚠ WARNING

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment could result in danger to the technician or the machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual.

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric service department for technical troubleshooting assistance before you proceed.
Call (216) 383-2531 or (800) 833-9353 (WELD).

TEST DESCRIPTION

This test will determine if the correct voltages are being:

a. Applied to the primary windings of the Main Transformer.

b. Induced on the secondary and auxiliary windings of the main transformer.

MATERIALS NEEDED

5/16" Nut Driver.
Volt-Ohm Meter.

Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC

MAIN TRANSFORMER TEST (CONTINUED)

TEST PROCEDURE

⚠ WARNING

The ON/OFF POWER SWITCH will be "hot" during these tests.

NOTE: Secondary voltages will vary proportionably with the primary input voltage.

1. Disconnect the main input power supply to the machine.

2. Remove the Case Top and Side Panels with a 5/16" nut driver.

3. Locate Plug J3 and Plug J6 on the G2332 Control PC Board.

NOTE: The location of Plugs may vary depending on the machine code.

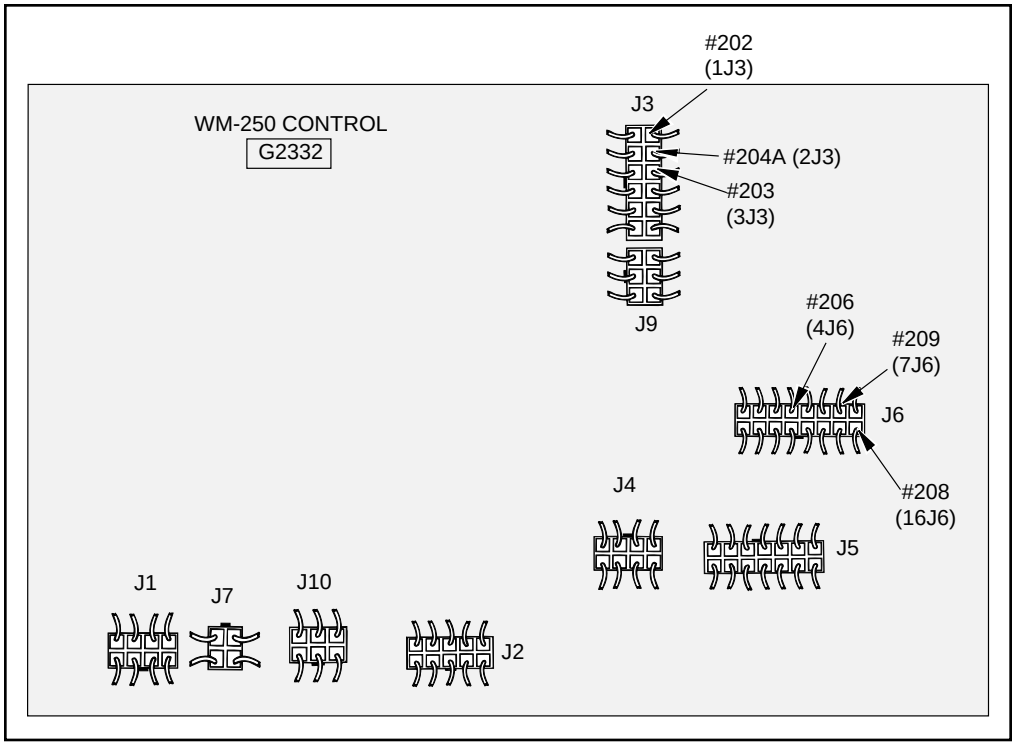


FIGURE F.1 - G2332 Control PC Board Main Transformer Test Points.

Return to Section TOC
Return to Master TOC

MAIN TRANSFORMER TEST (CONTINUED)

4. Locate the following leads on Plug J3:
G2332:

LEAD	PLUG LOCATION
#202 #203 #204 A	1J3 3J3 2J3

5. Connect main input power to the machine.

6. Turn the Wire-Matic 250 ON/OFF POWER SWITCH to ON.

7. Make the following voltage tests at Plug J3.

   a. Turn the machine OFF between each test.

   b. Carefully insert the meter probes into the back of each Molex Plug pin cavity to perform the test.

   G2332:

FROM LEAD	TO LEAD	EXPECTED VOLTAGE
#202 (1J3)	#203 (3J3)	30 VAC
#202 (1J3)	#204 A (2J3)	15 VAC
#203 (3J3)	#204 A (2J3)	15 VAC

8. Turn OFF the machine

9. Locate the following leads on Plug J6 on the G2332 Control PC Board.
G2332:

LEAD	PLUG LOCATION
#206 #208 #209	4J6 16J6 7J6

10. Turn ON the machine.

11. Make the following voltage tests at Plug J6 on the G2332 Control PC Board.

   a. Turn the machine OFF between each test.

   b. Carefully insert the meter probes into the back of each Molex Plug pin cavity to perform the test.

   G2332:

FROM LEAD	TO LEAD	EXPECTED VOLTAGE
#208 (16J6)	#209 (7J6)	60 VAC
#208 (16J6)	#206 (4J6)	30 VAC
#209 (7J6)	#206 (4J6)	30 VAC

   c. If any of the voltages tested are incorrect, check for loose or broken leads between the test points and the main transformer.

   d. If ALL the voltages tested are incorrect or missing, go to Step 12.

12. Test for correct nameplate input voltage between the H1 lead at the ON/OFF POWER SWITCH to H2 or H3 (H5 if connected for 575 VAC) at the reconnect panel. Voltage tested will vary depending on Input Voltage Connection. See wiring diagram for test point locations.

   a. If the voltage test is incorrect,

      - check for loose or broken leads between the reconnect panel and the ON/OFF POWER SWITCH.

      - test the ON/OFF POWER SWITCH for proper operation.

   b. If the correct nameplate voltage is being applied to the main transformer and one or more of the secondary voltages are missing or are incorrect, the main transformer may be faulty. Replace.

Return to Section TOC
Return to Master TOC

STATIC SCR RECTIFIER ASSEMBLY TEST

⚠ WARNING

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment could result in danger to the technician or the machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual.

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric service department for technical troubleshooting assistance before you proceed.
Call (216) 383-2531 or (800) 833-9353 (WELD).

TEST DESCRIPTION

This test is used to quickly determine if an SCR or diode is shorted or "leaky." See the Machine Waveform Section in this manual for normal and abnormal output waveforms.

MATERIALS NEEDED

Analog Ohmmeter (Multimeter).
Wire-Matic 250 wiring diagrams (See Electrical Diagrams Section of this Manual).
5/16" Nut Driver.
1/2" Open end or socket wrench.

Return to Section TOC
Return to Master TOC

STATIC SCR RECTIFIER ASSEMBLY TEST (CONTINUED)

TEST PROCEDURE

1. Disconnect main AC input power to the machine.

2. Disconnect Plugs J3 and J6 from the G2332 Control Board. This electrically isolates the SCR bridge assembly. See Figure F.2.

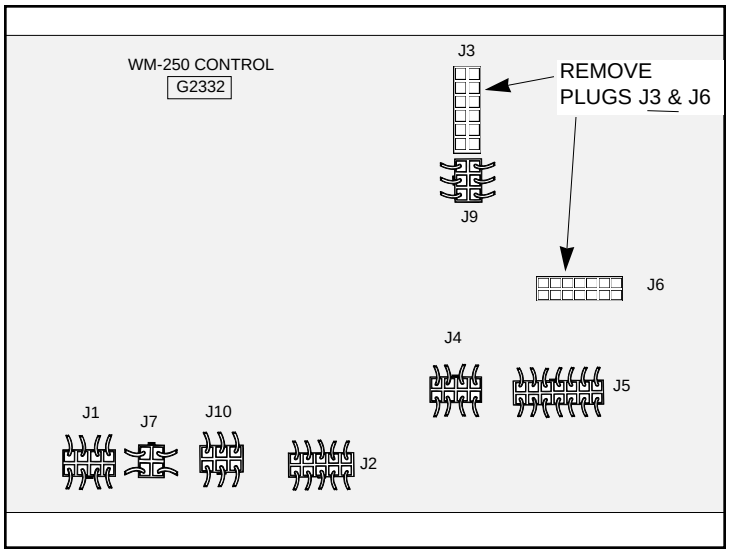


FIGURE F.2 - Remove Plugs J3 and J6 to Perform Static SCR Rectifier Assembly Test.

3. Verify that the capacitors have completely discharged with an Analog Volt-Ohm meter.

4. Disconnect leads X2 and X3 from the negative capacitor bank using a 1/2" open end wrench. See Figure F.3.

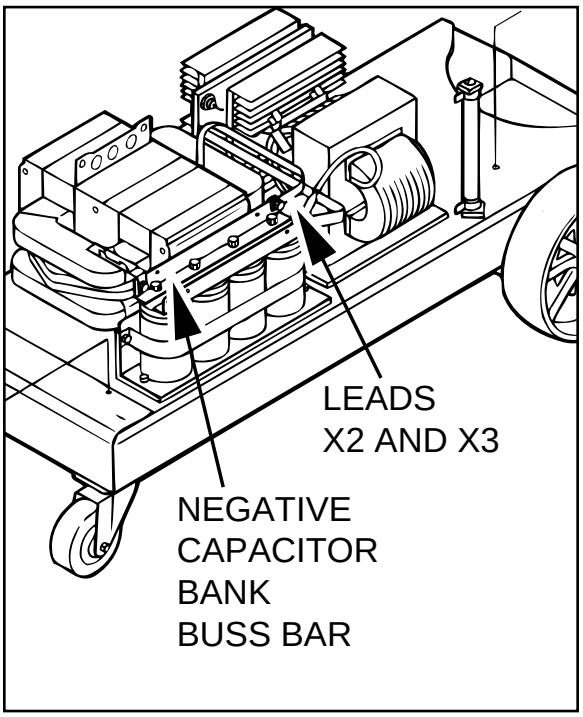


FIGURE F.3 - Location of Leads X2 and X3.

5. Separate leads X2 and X3 from the negative capacitor bank buss bar. Be sure there is no electrical contact. See Figure F.3.

Return to Section TOC
Return to Master TOC

STATIC SCR RECTIFIER ASSEMBLY TEST (CONTINUED)

NOTE: DO NOT DISASSEMBLE THE SCR RECTIFIER HEAT SINK ASSEMBLY.

6. Test for high or infinite resistance from the anode to the cathode of SCR 1. See Figure F.4. Use an analog ohmmeter (Multimeter).

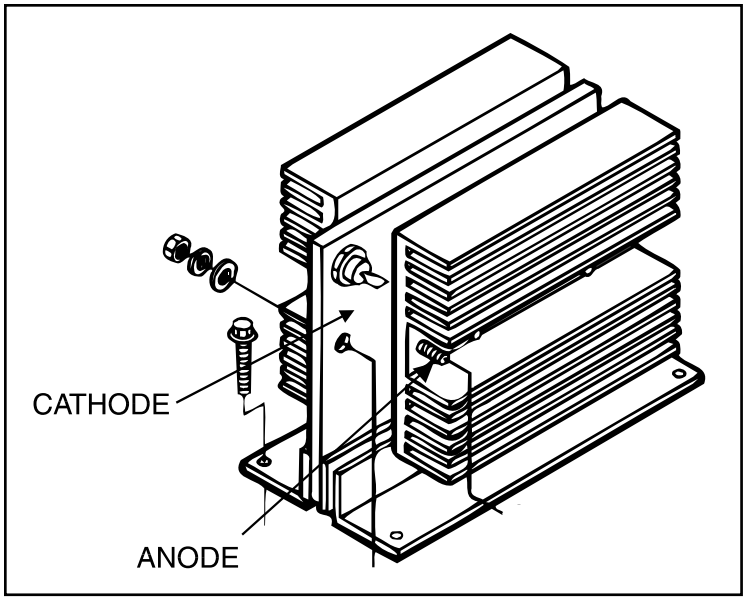


FIGURE F.4 - SCR 1 Test Points.

7. Test for high or infinite resistance from the cathode to the anode of SCR 1 by reversing the meter leads. See Figure F.4.

   a. If a high or infinite resistance is indicated for both tests 6 and 7, the SCR 1 is not “shorted”.

   b. If a low resistance is indicated in either tests 6 or 7, the SCR is faulty. Replace SCR Assembly.

8. Repeat Steps #7 to test SCR 2.

9. Reconnect leads X2 and X3.

10. Reconnect Plugs J3 and J6.

11. If this test did not identify the problem or to further test the SCR, go to the Active SCR Test.

Return to Section TOC
Return to Master TOC

ACTIVE SCR RECTIFIER ASSEMBLY TEST

⚠ WARNING

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment could result in danger to the technician or the machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual.

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric service department for technical troubleshooting assistance before you proceed.
Call (216) 383-2531 or (800) 833-9353 (WELD).

TEST DESCRIPTION

The Active SCR Test will determine if the device is able to be gated ON and conduct current from anode to cathode.

MATERIALS NEEDED

An SCR Tester as specified in this procedure.
Wire-Matic 250 wiring diagrams (See Electrical Diagrams Section of this Manual).
SCR Heat Sink Assembly Drawings.

Return to Section TOC
Return to Master TOC

ACTIVE SCR RECTIFIER ASSEMBLY TEST (CONTINUED)

TEST PROCEDURE

1. Disconnect main AC input power to the machine.

2. Disconnect Molex Plugs J3 and J6 from the G2332 Control Board. See Figure F.5.

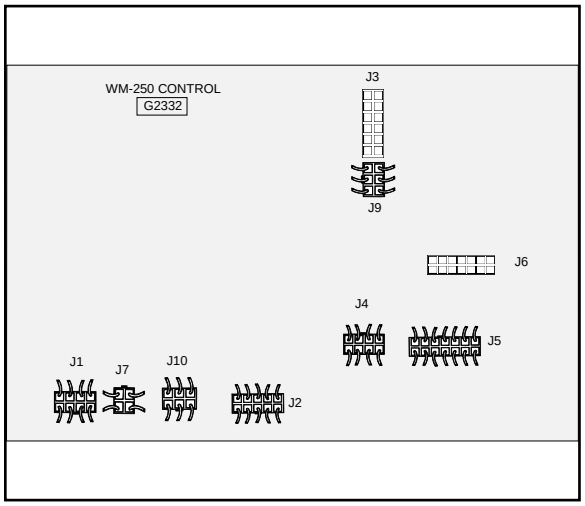


FIGURE F.5 - Control Board Molex Plug Locations for G2332 PC Control Board.

3. Verify that the capacitors have completely discharged with an Analog Volt-Ohm meter.

4. Disconnect leads X2 and X3 from the negative capacitor bank using a 1/2" open end wrench. See Figure F. 6.

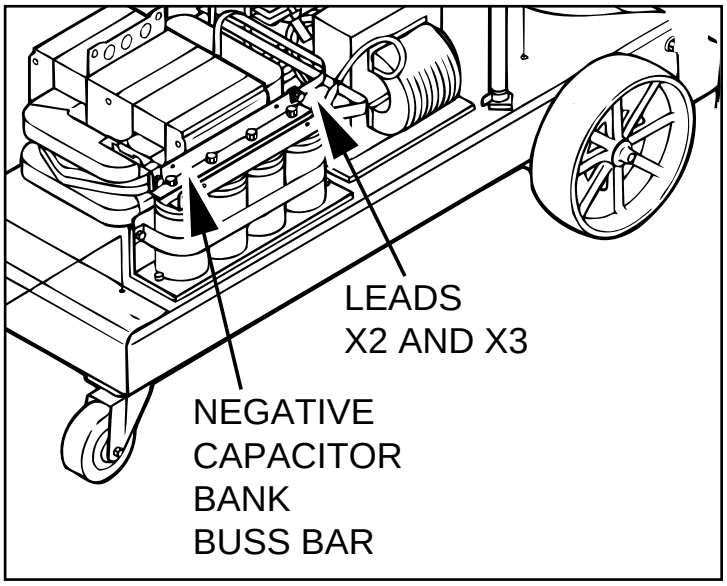


FIGURE F.6 - Location of Leads X2 and X3.

5. Separate leads X2 and X3 from the negative capacitor bank buss bar. Be sure there is no electrical contact. See Figure F.6.

NOTE: DO NOT DISASSEMBLE THE SCR RECTIFIER HEAT SINK ASSEMBLY.

6. Construct the circuit shown in Figure F.7. One 6-volt lantern battery can be used. R1 and R2 resistor values are ±10%. Set voltmeter scale low, at approximately 0-5 volts or 5-10 volts.

   a. Test the voltage level of the battery. Short leads (A) and (C). Close switch SW-1. Battery voltage should be 4.5 volts or higher. If lower, replace the battery.

Return to Section TOC
Return to Master TOC

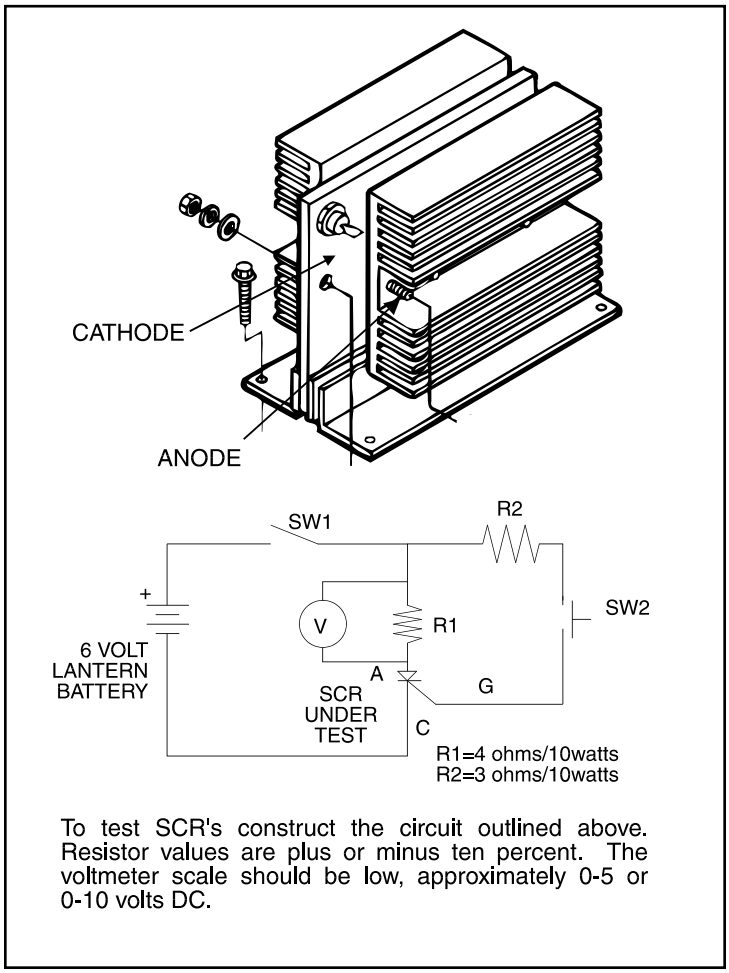
ACTIVE SCR RECTIFIER ASSEMBLY TEST (CONTINUED)

7. Connect the Tester to the SCR 1 as shown in Figure F.7.

   a. Connect Tester lead (A) to the anode.

   b. Connect Tester lead (C) to the cathode.

   c. Connect Tester lead (G) to the gate.



To test SCR's construct the circuit outlined above. Resistor values are plus or minus ten percent. The voltmeter scale should be low, approximately 0-5 or 0-10 volts DC.

FIGURE F.7 - SCR Tester Circuit and SCR connections.

8. Close switch SW-1.

NOTE: Switch SW-2 should be open.

9. Read meter for zero voltage.

   a. If the voltage reading is higher than zero, the SCR is shorted.

10. Close or keep closed switch SW-1.

11. Close switch SW-2 for 2 seconds and release and read meter.

   a. If the voltage is 3 - 6 volts while the switch is closed and after the switch is open, the SCR is functioning.

   b. If the voltages is 3-6 volts only when the switch is closed or there is no voltage when the switch is closed, the SCR is defective.

NOTE: Be sure battery is functioning properly. A low battery can affect the results of the test. Repeat Battery Test Procedure in Step 6 if needed.

12. Open switch SW-1.

13. Reconnect the Tester leads. See Figure F.7.

   a. Connect Tester lead (A) to the cathode.

   b. Connect Tester lead (C) to the anode.

   c. Disconnect Test lead (G) from the gate.

14. Close switch SW-1.

15. Read meter for zero voltage.

   a. If the voltage is zero, the SCR is functioning.

   b. If the voltage is higher than zero, the SCR is shorted.

16. Perform the Active Test Procedure outlined in Steps 5-13 for SCR 2.

17. Replace all SCR assemblies that do not pass the above tests.

18. Replace all Molex Plugs onto the Control Board and connect leads X2 and X3.

Return to Section TOC
Return to Master TOC

WIRE DRIVE MOTOR AND TACHOMETER FEEDBACK TEST

⚠ WARNING

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment could result in danger to the technician or the machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual.

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric service department for technical troubleshooting assistance before you proceed.
Call (216) 383-2531 or (800) 833-9353 (WELD).

TEST DESCRIPTION

This test will determine if the wire drive motor and voltage feedback circuit are functioning properly.

MATERIALS NEEDED

5/16" Nut Driver.
Volt-Ohmmeter.

Return to Section TOC
Return to Master TOC

WIRE DRIVE MOTOR AND TACHOMETER FEEDBACK TEST (CONTINUED)

TEST PROCEDURE

NOTE: POLARITY MUST BE OBSERVED FOR THESE TESTS.

Test for Correct Wire Drive Motor Armature Voltage

1. Disconnect main input power to the machine.

2. Remove the Case Top and Side Panels using a 5/16" nut driver.

3. Locate Plug J5 on the G2332 Control Board. See Figure F.8.

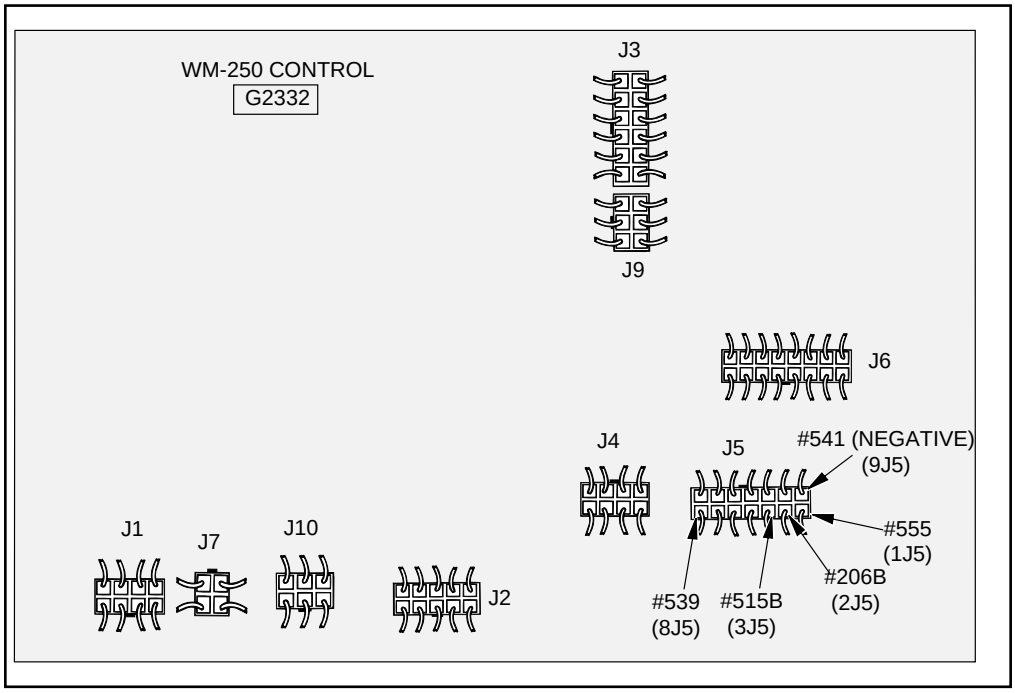


FIGURE F.8 - Plug J5 Location on G2332 PC Control Board.

Return to Section TOC
Return to Master TOC

WIRE DRIVE MOTOR AND TACHOMETER FEEDBACK TEST (CONTINUED)

4. Test for 2 - 25 VDC between lead #539 (positive) (8J5) and lead #541 (9J5) (negative) to determine if the correct armature voltage is being supplied. See Figure F.8.

    a. Insert probes in to the Molex pin cavities.

5. Pull the gun trigger.

6. Read meter. Normal DC volts is from 2 - 25 VDC. VDC varies depending on wire feed speed.

    a. If voltage to the wire drive motor armature is zero, check the wires between Plug J5 and the wire drive motor.

    b. If the wires are okay and voltage to the drive motor armature is zero, the Control Board may be faulty. Replace.

    c. If the correct DC armature voltage is present at the wire drive motor, the motor or motor brushes may be faulty. Test and/or replace.

    d. If the motor is running at high speed and the armature voltage is high and uncontrollable, proceed with the tachometer test.

Test for Supply Voltage to Tachometer

1. Test for 15 VDC between lead #515B (positive) (3J5) and lead #206B (negative) (2J5) . See Figure F.8 for pin locations.

    a. Insert probes into Molex pin cavities.

2. Pull gun trigger.

3. Read meter for 15 VDC.

    a. If the 15 VDC is present, check the leads to the tach circuit.

    b. If the leads are okay and 15 VDC is present, the correct voltage is being received from the Control Board. Go to Feedback Test.

    c. If the 15 VDC is not present and the leads are okay, the Control Board may be faulty. Replace.

Test for Feedback Voltage to the Control Board

1. Test for 1.5 - 3.5 VDC between lead #555 (positive) (1J5) and lead #206B (negative) (2J5) . See Figure F.8 for pin locations.

    a. Insert probes into Molex pin cavities.

2. Pull gun trigger.

3. Read meter for 1.5 - 3.5 VDC.

    a. If the 1.5 - 3.5 VDC is present, the tach circuit is sending the correct feedback signal to the Control Board.

NOTE: IF THE MOTOR IS NOT RUNNING, THE FEEDBACK VOLTAGE MAY BE FROM 0 TO 5 VDC.

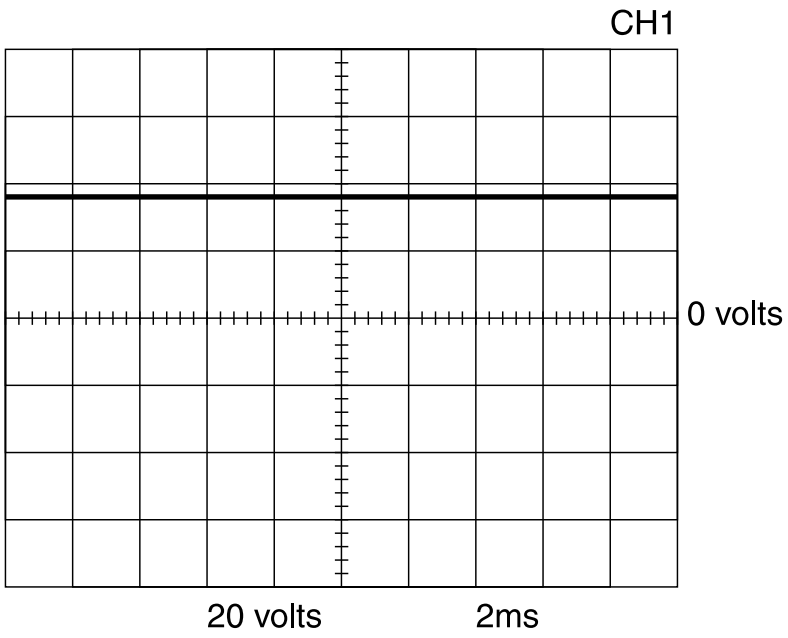
    b. If the 1.5 - 3.5 VDC is not present or not correct, the Control Board is not receiving the proper feedback voltage from the tach circuit. Check the leads from the tach circuit to the Control Board for loose or broken connections.

    c. If the leads are okay, the Control Board may be faulty. Replace.

Return to Section TOC
Return to Master TOC

Return to Section TOC
Return to Master TOC

NORMAL OPEN CIRCUIT VOLTAGE WAVEFORM

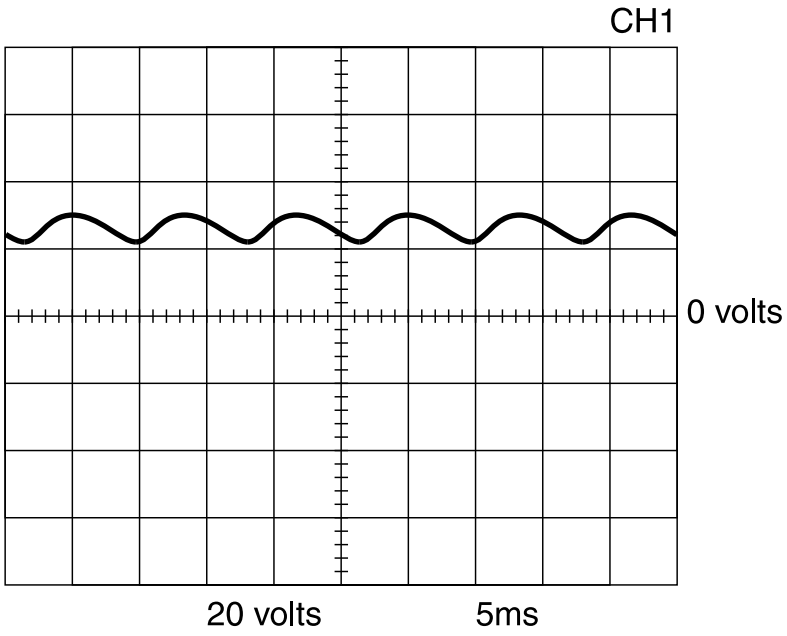


SCOPE SETTINGS

This is a typical DC output voltage waveform generated from a properly operating machine. Note that each vertical division represents 20 volts and that each horizontal division represents 2 milliseconds in time. Note: Scope probes connected at machine output terminals: (+) probe to electrode, (-) probe to work.	Volts/Div . . . . . .20 V/Div. Horizontal Sweep . . . . . .2 ms/Div. Coupling . . . . . .DC. Trigger . . . . . .Internal.

Return to Section TOC
Return to Master TOC

TYPICAL OUTPUT VOLTAGE WAVEFORM - MACHINE LOADED



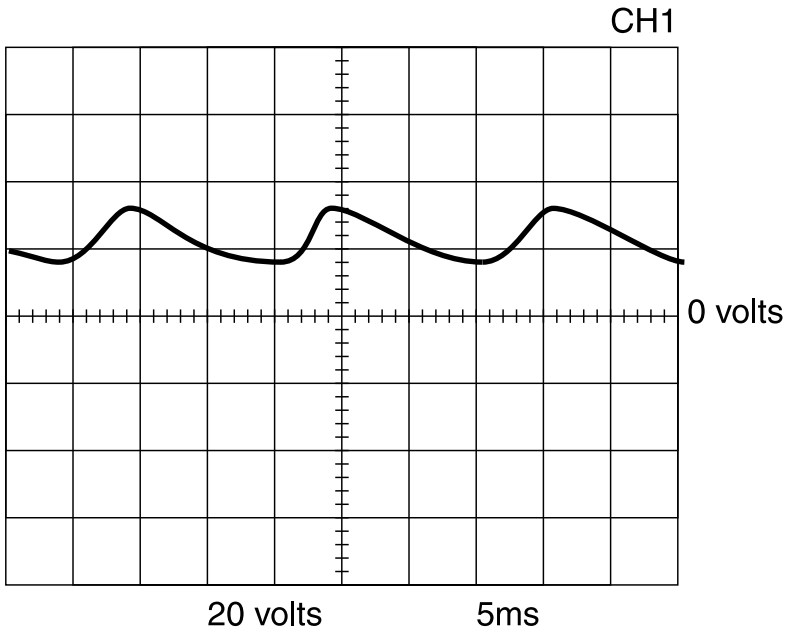
MACHINE LOADED TO 250 AMPS AT 26 VDC

SCOPE SETTINGS

This is a typical DC output voltage waveform generated from a properly operating machine. Note that each vertical division represents 20 volts and that each horizontal division represents 5 milliseconds in time. The machine was loaded with a resistance grid bank. Note: Scope probes connected at machine output terminals: (+) probe to electrode, (-) probe to work.	Volts/Div . . . . . .20 V/Div. Horizontal Sweep . . . . . .5 ms/Div. Coupling . . . . . .DC. Trigger . . . . . .Internal.

Return to Section TOC
Return to Master TOC

ABNORMAL OUTPUT VOLTAGE WAVEFORM - MACHINE LOADED ONE OUTPUT SCR NOT FUNCTIONING



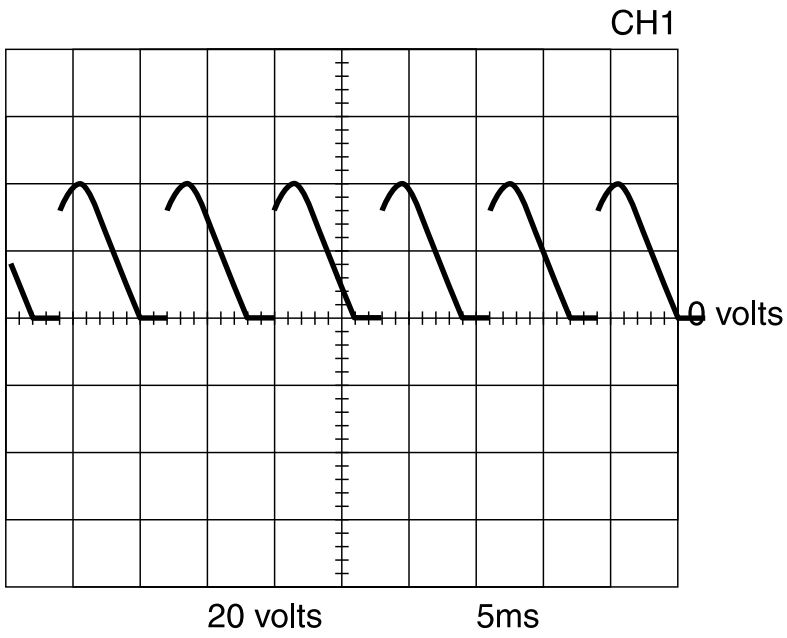
MACHINE LOADED TO 220 AMPS AT 22 VDC

SCOPE SETTINGS

This is NOT a typical DC output voltage waveform. One output SCR is not functioning. Note the increased ripple content. One SCR gate was disconnected to simulate an open or non-functioning output SCR. Each vertical division represents 20 volts and each horizontal division represents 5 milliseconds in time. The machine was loaded with a resistance grid bank. Note: Scope probes connected at machine output terminals: (+) probe to electrode, (-) probe to work.	Volts/Div . . . . . .20 V/Div. Horizontal Sweep . . . . . .5 ms/Div. Coupling . . . . . .DC. Trigger . . . . . .Internal.

Return to Section TOC
Return to Master TOC

ABNORMAL OPEN CIRCUIT VOLTAGE OUTPUT CAPACITOR BANK NOT FUNCTIONING



SCOPE SETTINGS

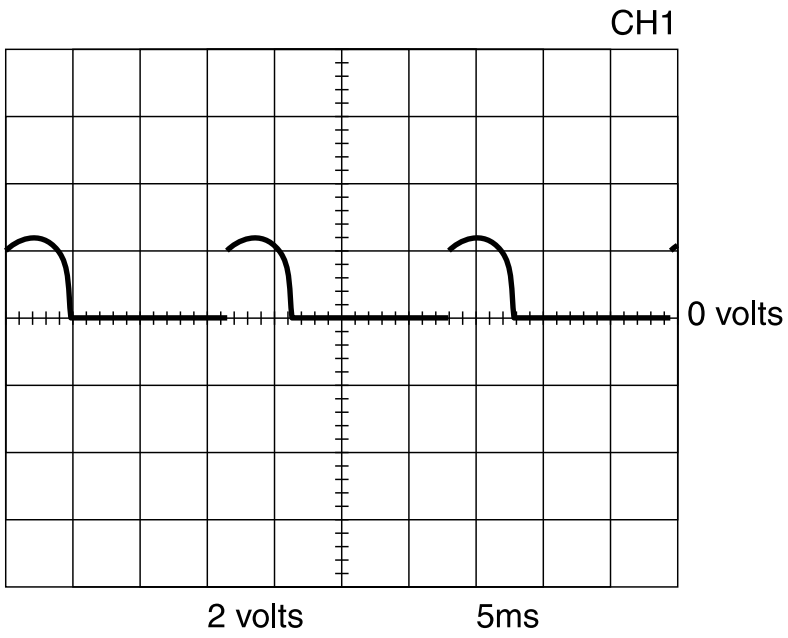
This is NOT the typical DC output voltage waveform. The output capacitors are not functioning. Note the lack of "filtering" in the output waveform. The output capacitor bank was disconnected. Each vertical division represents 20 volts and each horizontal division represents 5 milliseconds in time.

Note: Scope probes connected at machine output terminals: (+) probe to electrode, (-) probe to work.

Volts/Div	.20 V/Div.
Horizontal Sweep	.5 ms/Div.
Coupling	.DC.
Trigger	.Internal.

Return to Section TOC
Return to Master TOC

TYPICAL SCR GATE VOLTAGE WAVEFORM



SCOPE SETTINGS

This is a typical SCR gate pulse voltage waveform. The machine was in an open circuit condition (no load) and operating properly. Note that each vertical division represents 2 volts and each horizontal division represents 5 milliseconds in time. Note: Scope probes connected at Plug J3 on the control board. The (+) probe to lead G2, and the (-) probe to lead 204.	Volts/Div . . . . . .2 V/Div. Horizontal Sweep . . . . . .5 ms/Div. Coupling . . . . . .DC. Trigger . . . . . .Internal.

CONTROL PC BOARD REMOVAL AND REPLACEMENT

⚠ WARNING

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment could result in danger to the technician or the machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual.

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric service department for technical troubleshooting assistance before you proceed.
Call (216) 383-2531 or (800) 833-9353 (WELD).

⚠ CAUTION

Printed Circuit Boards can be damaged by static electricity. Follow static handling guidelines detailed in “PC Board Troubleshooting Procedures” at the beginning of this chapter.

REMOVAL AND REPLACEMENT PROCEDURE

MATERIALS NEEDED

5/16" Nutdriver.
Phillips head screwdriver.
Static electricity grounding strap.

CONTROL PC BOARD REMOVAL AND REPLACEMENT (CONTINUED)

REMOVAL AND REPLACEMENT PROCEDURE

1. Disconnect main input power the machine.
2. Remove the Case Top and Side Panels using 5/16" nut driver.
3. Disconnect all wiring harness plugs and Molex Plugs connected to the Control Board. See Figure F.9.

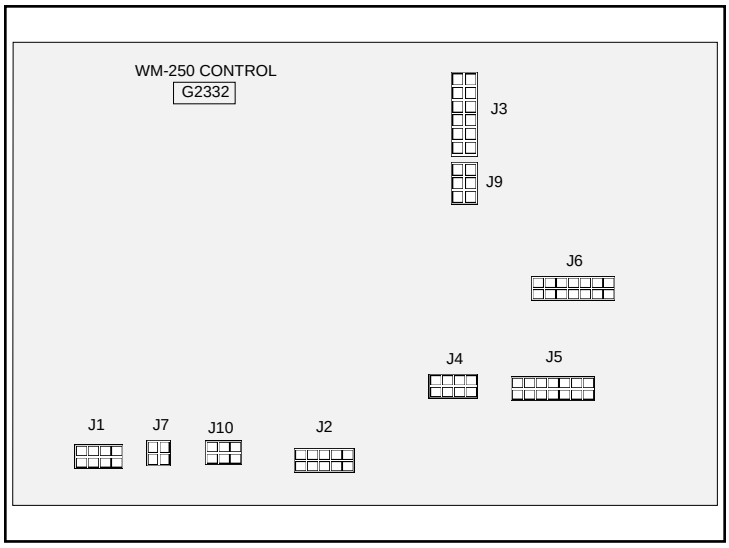


FIGURE F.9 - Wiring Harness and Molex Plug Locations.

4. Remove the eight Phillips Head mounting screws using a Phillips Head screwdriver. See Figure F.10.

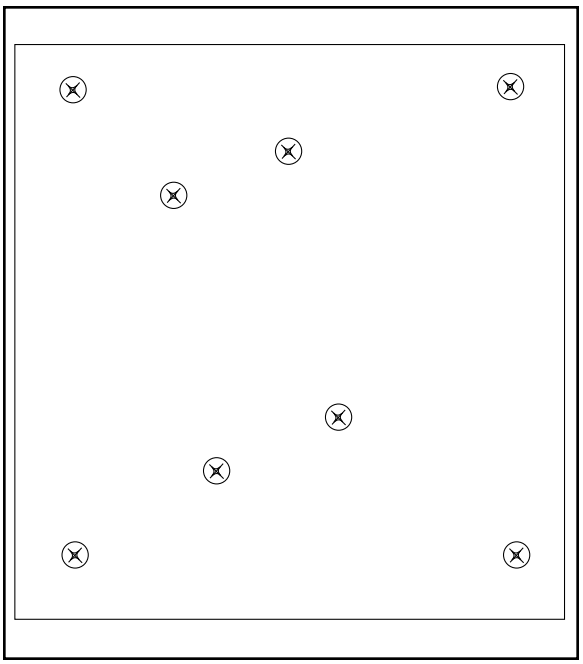


FIGURE F.10 - Control Board Mounting Screw Locations may vary with different Code Machines.

5. Lift the Control Board straight up and out from the machine.
6. Replace all mounting screws and wiring connections when installing the Control Board.

Return to Section TOC
Return to Master TOC

WIRE DRIVE ASSEMBLY REMOVAL AND REPLACEMENT

⚠ WARNING

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment could result in danger to the technician or the machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual.

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric service department for technical troubleshooting assistance before you proceed.
Call (216) 383-2531 or (800) 833-9353 (WELD).

MATERIALS NEEDED

Large slot head screwdriver.
5/16" Nut Driver.
Small slot head screwdriver.

Return to Section TOC
Return to Master TOC

WIRE DRIVE ASSEMBLY REMOVAL AND REPLACEMENT (CONTINUED)

PROCEDURE

1. Disconnect main input power to the machine.

2. Remove the Case Top and Side Panels.

3. Remove the large mounting screw with a large slot head screwdriver located in front of the drive roll. See Figure F.11.

   a. Note the placement of the insulators and washers for replacement.

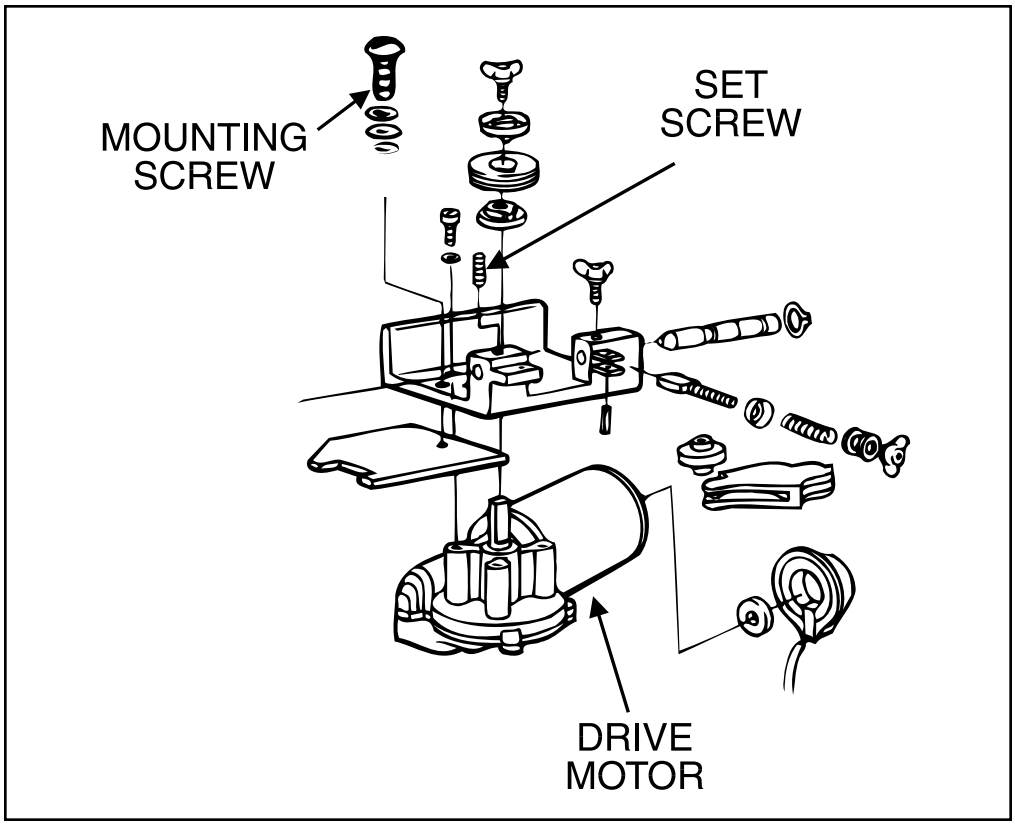


FIGURE F.11 - Wire Drive Assembly Removal

4. Using a small slot head screw driver, loosen the set screw holding the out going guide tube into the drive roll assembly. Carefully slide out the wire drive assembly.

5. Disconnect the six pin plug from the vertical baffle connector.

   a. The six pin plug contains the wire feed drive motor wires.

6. Remove carefully the drive motor and drive roll assembly.

Return to Section TOC
Return to Master TOC

SCR OUTPUT RECTIFIER REMOVAL & REPLACEMENT

⚠ WARNING

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment could result in danger to the technician or the machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual.

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric service department for technical troubleshooting assistance before you proceed.
Call (216) 383-2531 or (800) 833-9353 (WELD).

MATERIALS NEEDED

5/16" Nut driver.
1/2" Open end wrench.
1/2" Socket wrench, universal tool, and extension.
3/8" Open end wrench.
Slot head screwdriver.
Wire cutters.

Return to Section TOC
Return to Master TOC

SCR OUTPUT RECTIFIER REMOVAL & REPLACEMENT (CONTINUED)

PROCEDURE

1. Disconnect lead #208 and Transformer Lead X1 from the heat sink on the left side of the machine (facing the front) using a 1/2" socket wrench. See Figure F.12.

   a. Thin lead is always on the outboard side of the connection.

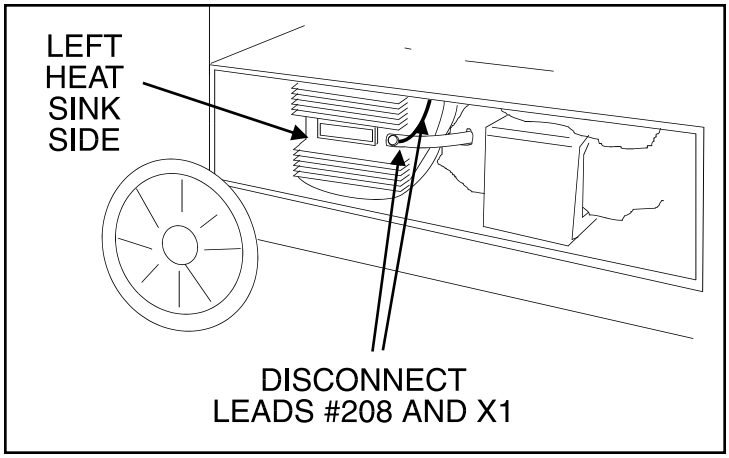


FIGURE F.12 - Heat Sink lead disconnection.

2. Disconnect lead #204 and heavy lead from the middle heat sink with a 1/2" socket wrench and 1/2" open end wrench. See Figure F.13.

3. Remove the diode lead from the negative capacitor band buss bar on the right side of the machine using a slot head screwdriver and 3/8" open end wrench.

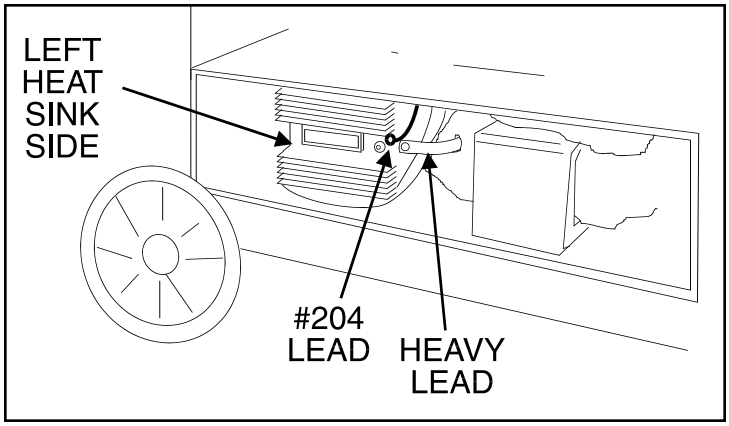


FIGURE F.13 - Heat Sink lead disconnection.

4. Cut the SCR gate leads G1 and G2 (see wire markers and wiring diagram) using wire cutters.

   a. The easiest access to these leads is from the right side of the machine.

   b. Cut any necessary cable ties.

5. Remove the four screws holding the SCR Assembly to the floor of the machine using a 5/16" nut driver.

6. Pivot the SCR Assembly counterclockwise to provide access to the right side heat sink. See Figure F.14.

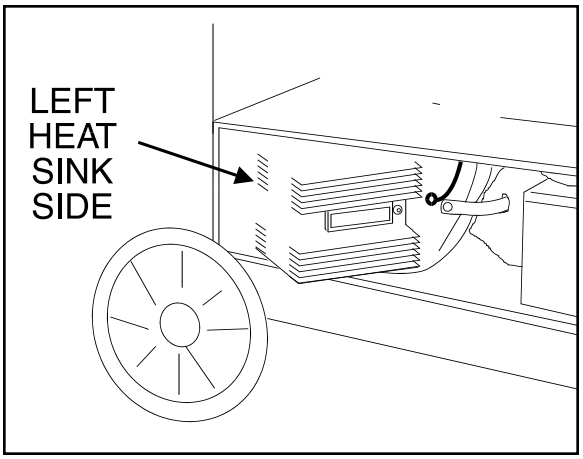


FIGURE F.14 - Heat Sink Lead Disconnection

7. Remove lead #209 and Transformer Lead X4 from the right side heat sink using a 1/2" socket wrench and 1/2" open end wrench.

8. Clear the leads and carefully remove the SCR Rectifier Assembly.

NOTE: When installing the SCR Rectifier Assembly, apply a thin coating of Dow Corning #340 Compound to the electrical connections.

Return to Section TOC
Return to Master TOC

CAPACITOR BANK REMOVAL AND REPLACEMENT

⚠ WARNING

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment could result in danger to the technician or the machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual.

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric service department for technical troubleshooting assistance before you proceed.
Call (216) 383-2531 or (800) 833-9353 (WELD).

⚠ WARNING

THE LIQUID ELECTRODE IN THE CAPACITORS IS TOXIC. DO NOT TOUCH THE CAPACITORS WITH ANY PART OF YOUR BODY.

MATERIALS NEEDED

5/16" Nut driver.
5/16" Socket wrench, extension, and universal tool.
1/2" Open end wrench.
3/8" Open end wrench.
Slot head screwdriver.
Wiring diagram.

Return to Section TOC
Return to Master TOC

CAPACITOR BANK REMOVAL AND REPLACEMENT (CONTINUED)

PROCEDURE

See Figure F.15 for location of Capacitor Bank Removal and Replacement components.

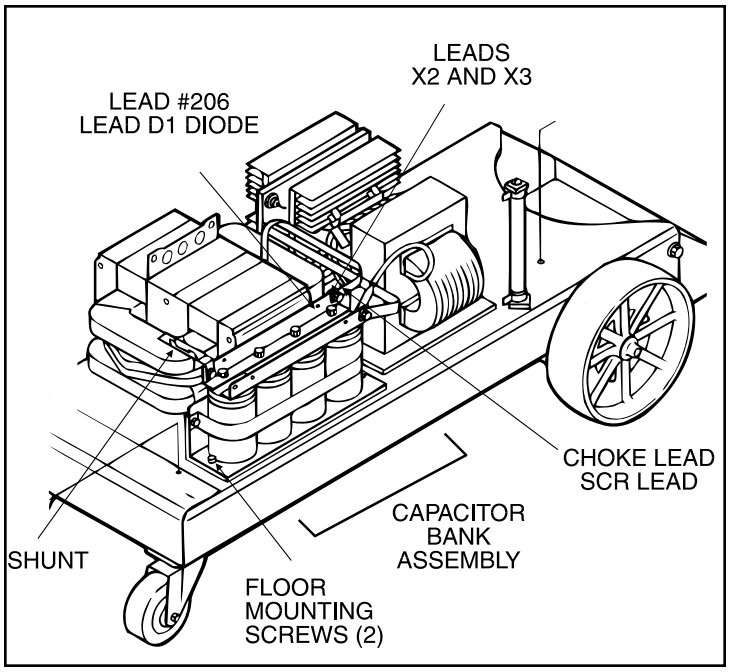


FIGURE F.15 - Location of Capacitor Bank Removal and Replacement Components.

1. Disconnect main input power to the machine.

2. Test that the capacitors are discharged using a volt ohmmeter. Polarity must be observed.

3. Remove the two transformer secondary leads (X2 and X3) for the negative capacitor bank buss bar using two 1/2" open end wrenches.

4. Remove the output choke lead and the heavy lead extending from the SCR Rectifier Assembly to the positive capacitor bank buss bar using a 1/2" open end wrench.

5. Remove lead #206 and the D1 diode lead from the negative capacitor bank buss bar using a slot head screwdriver and 3/8" open end wrench.

6. Remove the #204 lead from the positive buss bar.

7. Remove the shunt from the negative capacitor bank buss bar using a 1/2" socket wrench with a universal tool adapter.

   a. Two people may be required to remove the shunt. One person may have to reach through from the left side of the machine to keep the bolt in position while the other person loosens the nut.

8. Remove the two screws holding the capacitor bank to the floor of the machine using a 5/16" nut driver.

9. Clear the leads and carefully remove the capacitor bank assembly from the machine.

Return to Section TOC
Return to Master TOC

MAIN TRANSFORMER REMOVAL AND REPLACEMENT

⚠ WARNING

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment could result in danger to the technician or the machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual.

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric service department for technical troubleshooting assistance before you proceed.
Call (216) 383-2531 or (800) 833-9353 (WELD).

MATERIALS NEEDED

5/16" Nut Driver.
1/2" Open end wrench.
3/8" Open end wrench.
1/2" Socket wrench, extender, universal adapter.
Wire cutters.

Return to Section TOC
Return to Master TOC

MAIN TRANSFORMER REMOVAL AND REPLACEMENT (CONTINUED)

PROCEDURE

1. Disconnect main input power to the machine.
2. Remove the Case Top and Side Panels.
3. Perform the Capacitor Bank Removal Procedure.
4. Remove lead X1 from the left side SCR heat sink assembly using a 1/2" socket wrench, extender and universal adapter.
5. Remove lead X4 from the right side heat sink assembly using a 1/2" socket wrench, extender and universal adapter.
6. Disconnect all leads from the reconnect panel using a 3/8" open end wrench.
7. Disconnect all leads from the POWER SWITCH.
8. Remove the POWER SWITCH.
9. Label and cut leads #202, #203, #204A.
    a. Cut lead #204A at a point just in front of the transformer.
    b. These leads must be re-spliced during reassembly.
    c. An alternative to cutting these leads is to remove them from Molex Plug J3 and pull them free of any wire bundles.
10. Remove all cable ties, wire mounts, - and any harness tape that could get in the way during transformer removal using wire cutters and screwdriver.
11. Remove the four screws mounting the transformer to the floor of the machine using a 5/16" nut driver.
12. Disconnect the positive output lead at the wire drive motor.
13. Remove the strain relief grommet through which the positive output lead passes through the horizontal baffle of the machine.
14. Pull down on the positive output lead until it slides out the hole in the baffle.
15. Carefully remove the main transformer.
    a. Be sure all leads are clear.

Return to Section TOC
Return to Master TOC

FAN MOTOR AND FAN REMOVAL AND REPLACEMENT

⚠ WARNING

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment could result in danger to the technician or the machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual.

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric service department for technical troubleshooting assistance before you proceed.
Call (216) 383-2531 or (800) 833-9353 (WELD).

MATERIALS NEEDED

3/4" Open end wrench.
1/2" Socket wrench with extension.
Phillips head screwdriver.

Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC

FAN MOTOR AND FAN REMOVAL AND REPLACEMENT (CONTINUED)

PROCEDURE

See Figure F.16 for fan motor and fan removal components.

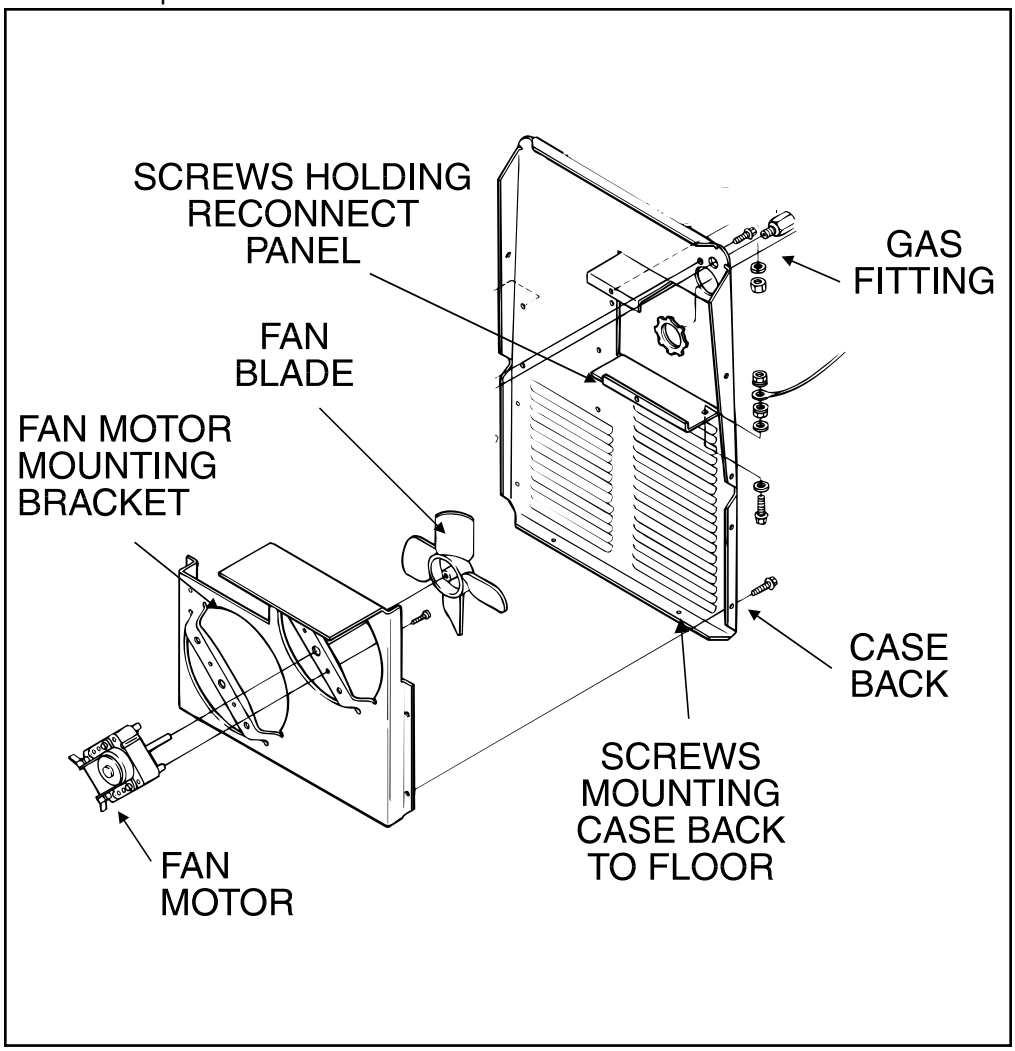


FIGURE F.16 - Fan Motor and Fan Removal Components

1. Remove the Case Back screws.
2. Remove the gas solenoid using a 3/4" open end wrench.
3. Using a 5/16” wrench, remove the 5 screws holding the fan motor mounting bracket to the case back.
4. Tilt the Case Back away from the machine and remove the screws holding the Case Back to the floor of the machine using a 1/2" socket wrench with extension.
5. Loosen the two screws holding the reconnect panel in place and a slide the reconnect panel from the frame.
6. Remove the fan blade. Note fan blade position on motor shaft for reference for replacing fan.
   a. Pry the fan blade off the motor.
   b. Slide the fan blade off the motor shaft.

Return to Section TOC
Return to Master TOC

FAN MOTOR AND FAN REMOVAL AND REPLACEMENT (CONTINUED)

7. Remove the fan motor.

   a. Loosen and remove the two screws from the motor mounting bracket using a slot head screw driver.

   b. When the motor is free from the mounting bracket, place it carefully on the bottom of the machine.

   c. Cut any necessary wire wraps bundling the motor leads.

   d. Remove the leads from the fan motor.

8. Install the replacement motor in the reverse order of removal.

9. Install the fan blade. When installing the fan blade, the blade is flush with the end of the motor shaft.

   a. Spin the fan to be sure it is free to rotate.

10. Reassemble the remaining components in reverse order of removal.

Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC

Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC

RETEST AFTER REPAIR

INPUT IDLE AMPS AND WATTS

Input Volts/Hertz	Maximum Idle Amps	Maximum Idle Watts
230/60	6.4	375

OPEN CIRCUIT VOLTAGE

10 to 40 VDC	35-40 VDC Strike Voltage

WIRE SPEED RANGE

50 - 600 IPM (1.27 - 15.2 m/minute)

Return to Section TOC
Return to Master TOC

NOTES

TABLE OF CONTENTS
- ELECTRICAL DIAGRAMS SECTION -

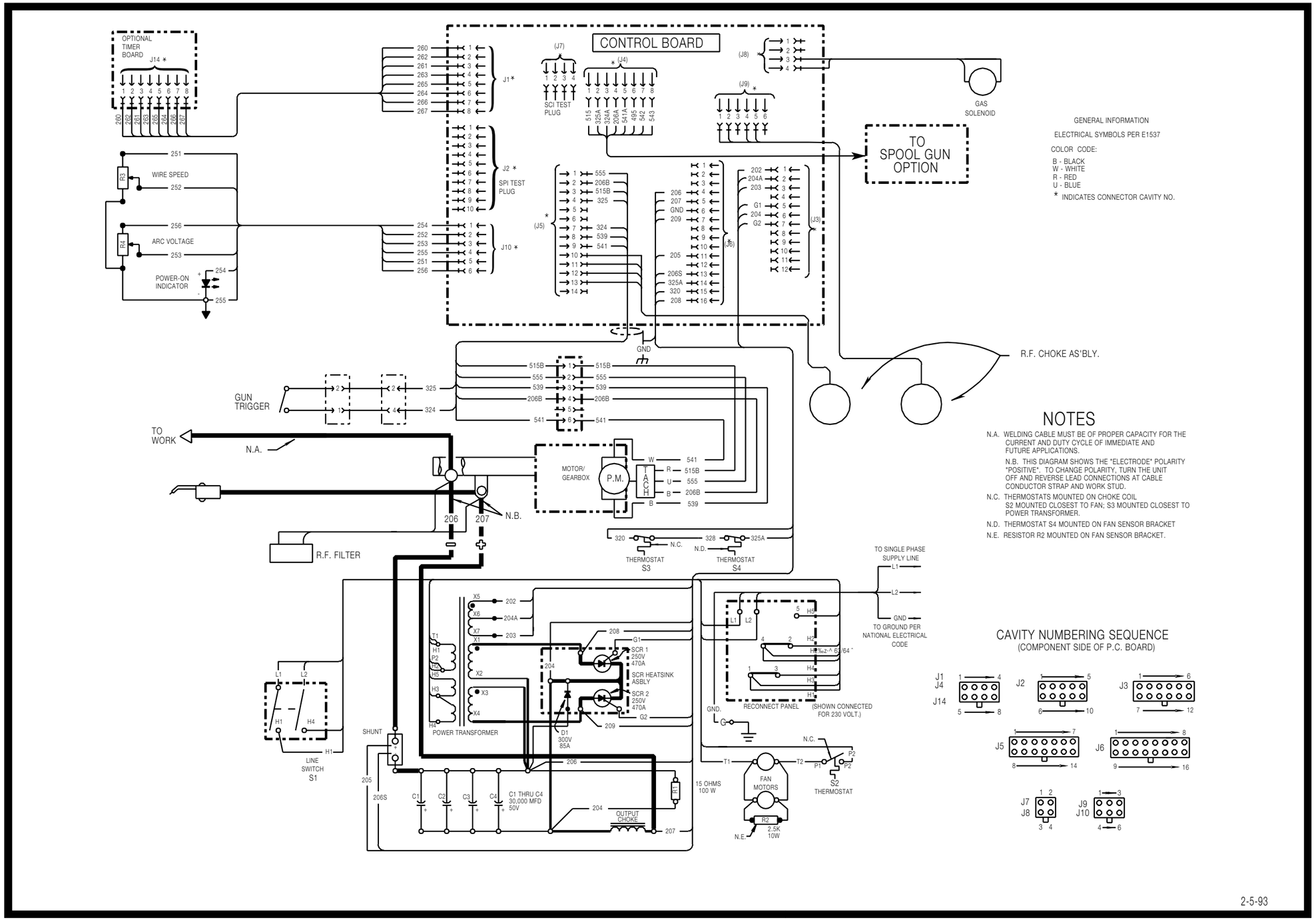
Electrical Diagram Section . . . . . Section G

Wiring Diagram (230/460/575) Code 10004 . . . . . G-2
Wiring Diagram (230/460/575) Code 10003 . . . . . G-3
Wiring Diagram (208/230) Code 9800 . . . . . G-4
Wiring Diagram (208/230) Code 9799 . . . . . G-5
Control PC Board (G2332) Schematic G-6
Control PC Board (G2332) Layout G-7

Return to Master TOC
Return to Master TOC
Return to Master TOC
Return to Master TOC

NOTES

Wiring Diagram (230/460/575) Code 10004

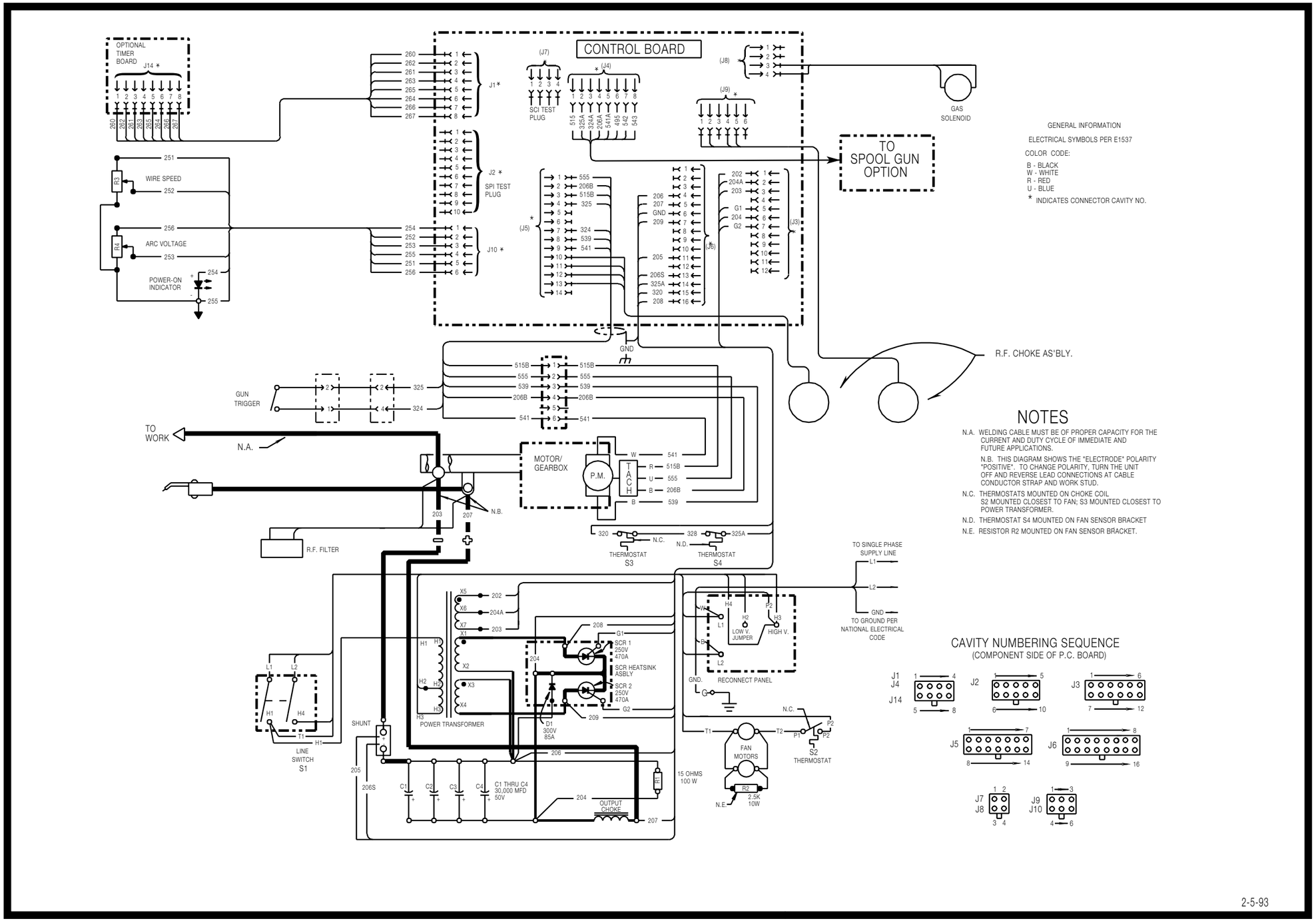


L9077

NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual. The specific diagram for a particular code is pasted inside the machine on one of the enclosure panels.

Return to Section TOC
Return to Master TOC

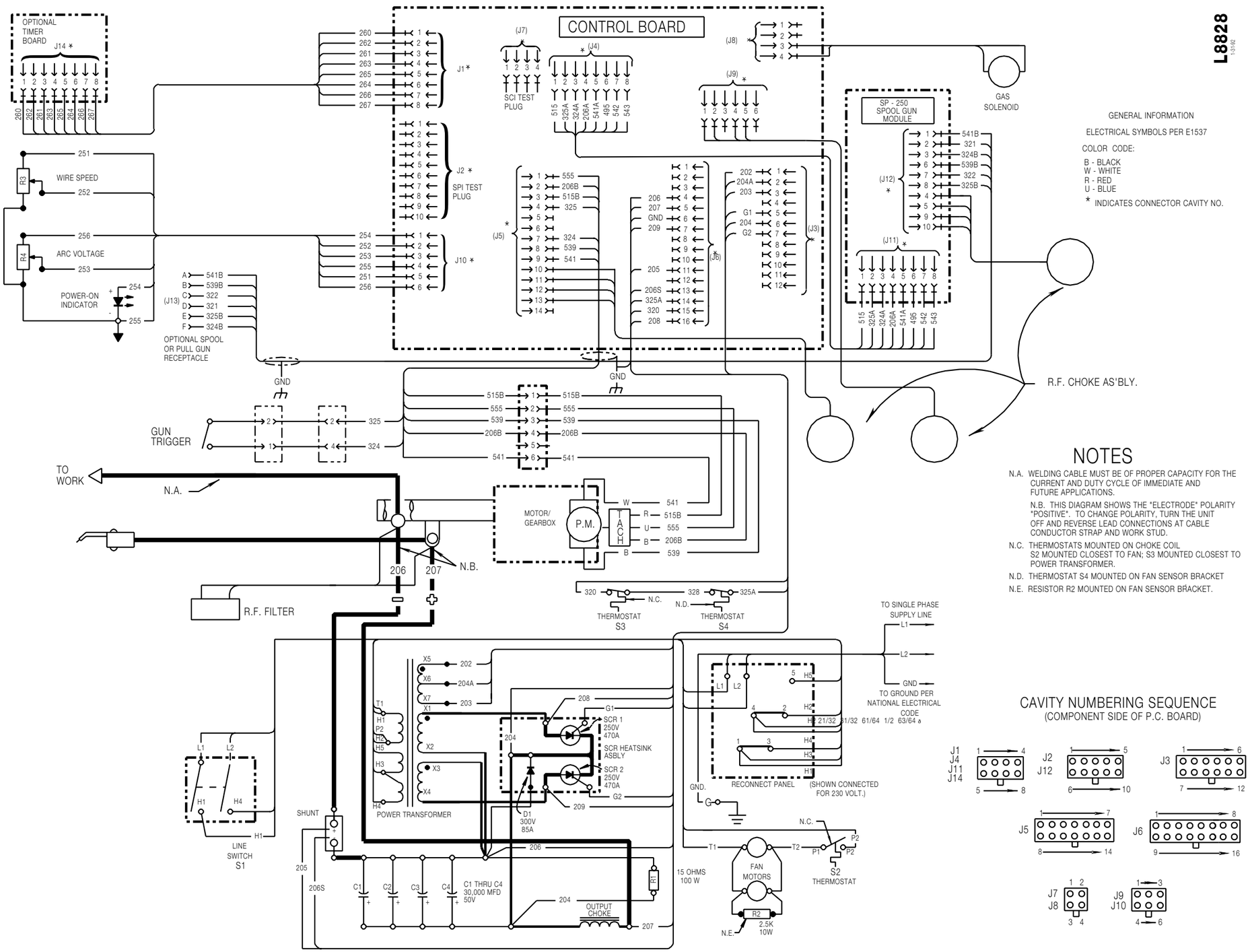
Wiring Diagram (230/460/575) Code 10003



NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual. The specific diagram for a particular code is pasted inside the machine on one of the enclosure panels.

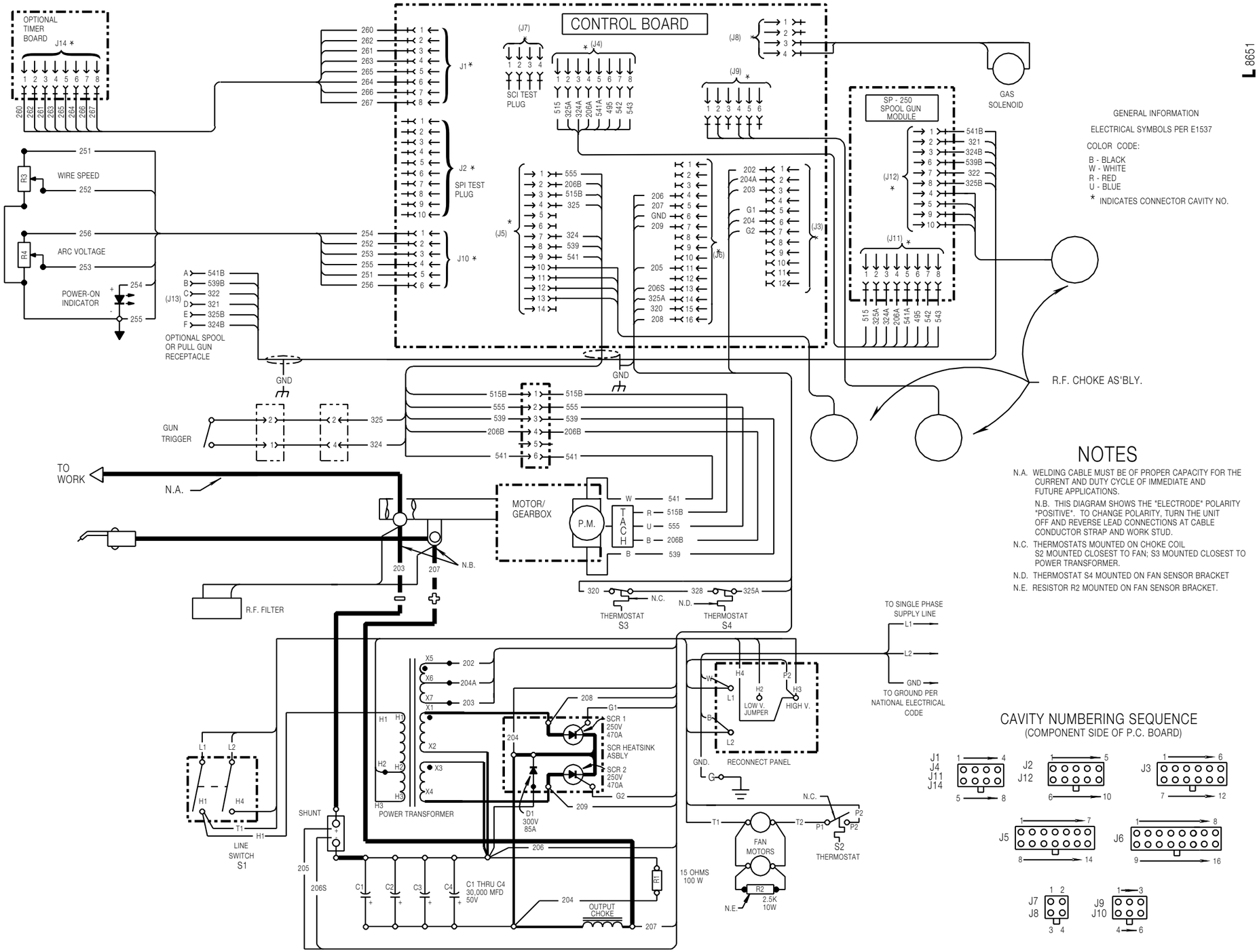
Return to Section TOC Return to Master TOC

Wiring Diagram (208/230) Code 9800



NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual. The specific diagram for a particular code is pasted inside the machine on one of the enclosure panels.

Wiring Diagram (208/230) Code 9799

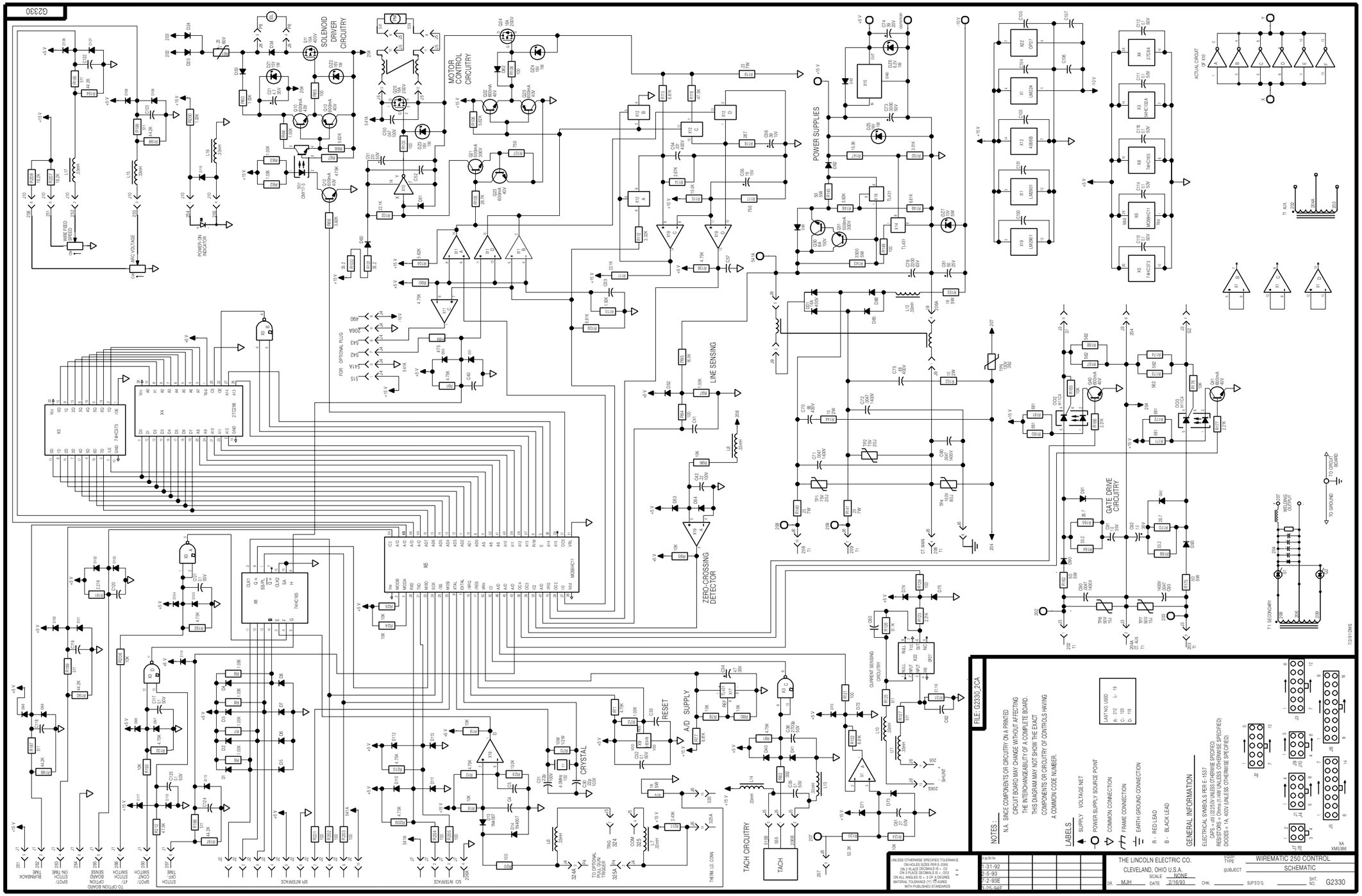


NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual. The specific diagram for a particular code is pasted inside the machine on one of the enclosure panels.

Return to Section TOC Return to Master TOC

Return to Section TOC
Return to Master TOC

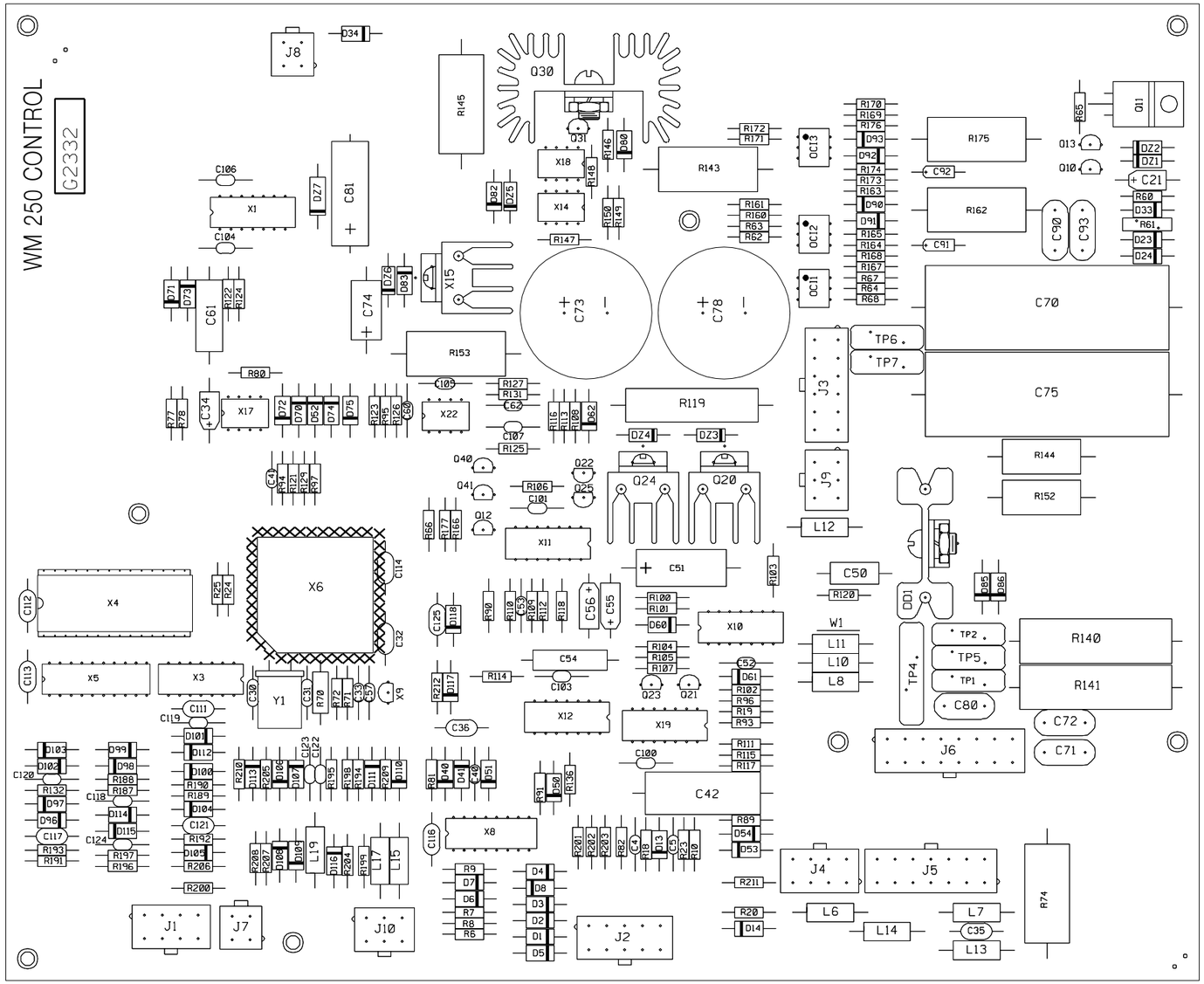
Control PC Board (G2332) Schematic



NOTE: Lincoln Electric assumes no responsibility for liablilities resulting from board level troubleshooting. PC Board repairs will invalidate your factory warranty. **Individual Printed Circuit Board Components are not available from Lincoln Electric.** This information is provided for reference only. Lincoln Electric discourages board level troubleshooting and repair since it may compromise the quality of the design and may result in danger to the Machine Operator or Technician. Improper PC board repairs could result in damage to the machine.

Return to Section TOC
Return to Master TOC

Control PC Board (G2332) Layout



ITEM	REQ'D.	IDENTIFICATION
C4, C5, C33, C40, C41, C52, C53 C57, C60, C62, C100, C101, C103 C104, C105, C106, C107, C118 C119, C120, C122, C123, C124	23	.022/50
C21, C34	2	4.7/35
C30, C31	2	22pF/100
C32, C35, C111, C112, C113 C114, C116, C117, C121, C125	10	.1/50
C36	1	2700pF/50
C42	1	.22/100
C50	1	.047/100
C51	1	20/50
C54	1	.001/400
C55	1	18/15
C56	1	39/10
C61	1	.27/50
C70, C75	2	.68/400
C71, C72, C80, C90, C93	5	.0047 or .005/1400
C73	1	3300/50
C74	1	39UF/20V
C78	1	2200/63V
C81	1	50/25
C91, C92	2	1.0/35
D1, D2, D3, D4, D5, D6, D7, D8 D23, D24, D33, D34, D40, D41 D50, D51, D52, D53, D54, D60 D61, D62, D70, D71, D72, D73 D74, D75, D80, D82, D83, D85 D86, D90, D91, D92, D93, D96 D97, D98, D99, D100, D101, D102 D103, D104, D105, D106, D107 D108, D109, D110, D111, D112 D113, D114, D115, D116, D117, D118	60	1N4004
D13, D14	2	1N4007
DD1	1	DUAL DIODE
DZ1	1	1N4744A
DZ2	1	1N4745A
DZ3, DZ4, DZ5	3	1N4746A
DZ6	1	1N4735
DZ7	1	1N5347B
J1, J4	2	HEADER
J2	1	HEADER
J3	1	HEADER
J5	1	HEADER
J6	1	HEADER
J7, J8	1	HEADER
J9, J10	2	HEADER
L6, L7, L8, L10, L11, L12, L13 L14, L15, L17, L19	11	330uH
OC11	1	
OC12, OC13	2	
Q10, Q12, Q22, Q23, Q40, Q41	6	2N4401
Q11	1	N-CHANNEL FET
Q13, Q25	2	2N4403
Q20	1	HEAT SINK ASSLY
Q21, Q31	2	NPN TRANSISTOR
Q24	1	HEAT SINK ASSLY
Q30	1	HEAT SINK ASSLY
R6, R7, R8, R9, R60, R62, R63 R64, R72, R200	10	1K 1/4W
R10, R71, R81, R90, R91, R132 R136, R192, R209, R210	10	4.75K
R18, R19, R24, R25, R78, R80, R93 R96, R124, R163, R176, R193, R206	13	10K 1/4W
R20, R65, R94, R103, R108, R121 R129, R148, R201, R202, R203 R204, R205	13	100 1/4W
R23, R115, R147	3	15K 1/4W
R61	1	PTC THERMISTOR
R66, R146	2	3.92K 1/4W
R67	1	475K 1/4W
R68, R104, R106	3	5.62K 1/4W
R70	1	10M 1/2W
R74, R153	2	1K 5W
R77, R109, R113, R122, R149	5	6.81K 1/4W
R82	1	332 1/4W
R89	1	475 1/4W
R95	1	16.5K 1/4W
R97, R110	2	1.5K 1/4W
R100, R101, R164, R169	4	33.2 OHM 1/4W
R102, R111	2	22.1K 1/4W
R105	1	26.7K 1/4W
R107, R117	2	750 1/4W
R112	1	3.32K 1/4W
R114	1	2.67K 1/4W
R116, R212	2	47.5K 1/4W
R118	1	267 1/4W
R119	1	.25 OHM, 7W
R120	1	52.3K 1/4W
R123, R166, R177, R191	4	2.21K 1/4W
R125, R127, R187, R189, R195 R196, R199	7	511 1/4W
R126, R131	2	51.1K 1/4W
R140, R141	2	.25 7W
R143	1	3.3K 5W
R144, R152	2	10 2W
R145, R162, R175	3	50 5W
R150	1	3.01K 1/4W
R160, R161, R171, R172	4	681 1/4W
R165, R170	2	26.7 1/4W
R167, R168, R173, R174	4	562 1/4W
R188, R190, R194, R197, R198	5	44.2K 1/4W
R207, R208	2	18.2K 1/4W
TP1, TP2	2	20J
TP4	1	80J
TP5	1	38J
TP6, TP7	2	15J
W1	1	20 AWG
X1	1	LM224 OP-AMP
X3	1	QUAD 2-INPUT
X4	1	
X5	1	TRI-STATE OCTAL
X6	1	52 PIN SOCKETED IC
X8	1	
X9	1	RESET I.C.
X10	1	MC14584
X11, X19	2	
X12	1	
X14, X17, X18	3	
X15	1	HEAT SINK ASSLY
X22	1	
Y1	1	4.0 MHz

ITEM	REQ'D	PART NO.	DESCRIPTION
1	1	G2331-D	CONTROL P.C. BOARD BLANK
2	1	S17914-1	SOCKET
3	1	S20209-52	SOCKET
4	.5 OZ.	E2681	SEALANT
5	.1 FT.	E1243/1-1.00 WIDE	TAPE

NOTE: Lincoln Electric assumes no responsibility for liablilities resulting from board level troubleshooting. PC Board repairs will invalidate your factory warranty. **Individual Printed Circuit Board Components are not available from Lincoln Electric.** This information is provided for reference only. Lincoln Electric discourages board level troubleshooting and repair since it may compromise the quality of the design and may result in danger to the Machine Operator or Technician. Improper PC board repairs could result in damage to the machine.